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333 Jay Street, Brooklyn 1, New York

PHYSICS DEPARTMENT

FREE ELECTRON MODEL CALCULATION OF THE DEPENDENCE OF THE

ATTENUATION OF TRANSVERSE SOUND WAVES ON A MAGNETIC FIELD

PARALLEL TO THE LATTICE DISPLACEMENT

by

Harold L. Grubin

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RESEARCH REPORT

POLYTECHNIC INSTITUTE OF BROOKLYN

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I.   ....   <u>ABSTRACT</u>

The results of a calculation of the attenuation of ultrasonic waves

in a metal when a d.c. magnetic field is present in a direction parallel

to the polarization direction of a sound wave is described. A principal

part of the report includes tables of use to anyone interested in attenuation

calculations. Graphical results for the case in question are included.

II.   <u>INTRODUCTION AND DISCUSSION</u>

This note* reports the results of a calculation of the attenuation of

ultrasonic waves in a metal when a d.c. magnetic field $\underline{H}$ is present in a

direction parallel to the polarization direction $\underline{U}$ of a transverse sound

wave. The method of treatment involves the simultaneous solution of

Maxwell's equations with the Boltzmann transport equation, applied to a free

electron model. Thus, the formulation of the problem is the same as that of

Cohen, Harrison and Harrison[1] who in their general discussion of the problem

include an evaluation of the attenuation for an infinite electronic mean free

path. Indeed the analytical results obtained are identical with those of CHH,

however, we solved the linearized Boltzmann equation by standard techniques of

partial differential equations rather than by Chambers method as employed by

CHH; furthermore, the attenuation has been evaluated for a set of different

values of the electronic mean free path.

The results shown in Fig. 1 may be regarded as the attenuation $Re(\alpha)$

plotted against $1/H$, for a series of different values of the electronic mean

free path $\underline{l}$ (corresponding to different ql[2]). The abscissa is the dimension-

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*Based on a thesis submitted in partial fullfillment of the requirements for

the degree of Master of Science (Physics) at the Polytechnic Institute of

Brooklyn.

less variable $X_F = q\, v_F/\omega_c$ where ω_c is the cyclotron frequency eH/mc. The results shown in Fig. 1, however, are not in agreement with experimental findings[3] in particular the presence of a substantial peak in the magneto-acoustic oscillations observed experimentally is not discernible in the free electron model result.

Each curve represents a monotonically increasing function, approaching a limit at zero magnetic field (large X_F), identical with the zero field limit indicated by Pippard[4]. For curves corresponding to larger electronic mean free paths we observe the presence of slight "wiggles" that have the appearance of oscillations about curves having simpler forms. This is most apparent when we consider the curve for infinite mean free path, here we appear to have oscillations about a curve of constant slope. We note that the curve for infinite electronic free path is the same as that of CHH. The oscillations are a consequence of the presence of Bessel functions in the expression of the magneto-acoustic conductivity (see below).

The theory requires the calculation, from the Boltzmann equation, of the magneto-acoustic conductivity. The specific expression turns out to be:

$$\sigma = 3\sigma_0 \sum_{n=-\infty}^{+\infty} \frac{r_n(X_F)}{1+i\tau(n\omega_c-\omega)} \tag{1}$$

where σ_0 is the d.c. conductivity $\dfrac{N_0 e^2 \tau}{m}$, N_0 the electron density at absolute zero and:

$$r_n(X_F) = \int_0^{\pi/2} d\theta\, J_n^2(X_F \sin\theta)\cos^2\theta \sin\theta \tag{2}$$

J_n being a Bessel function of the first kind[5]. Equation (1) is the same as Eq. (4.1) of CHH. The attenuation coefficient Re(α) is then:

$$Re(\alpha) = \frac{m}{Mc_s \tau} \ Re\left[\frac{1}{\sigma/\sigma_0} - 1 \right] \qquad . \qquad (3)$$

Some comparison may be made between the curves presented in here and those reported by Kjeldaas and Holstein[6] for the case of a magnetic field perpendicular to the direction of polarization of a transverse sound wave. We observe:

a) the corresponding expression for the zero
field limits are the same,
b) ~~maxima in the attenuation curves of Kjeldaas
and Holstein correspond to valleys in the
curves shown here.~~

It should be noted that the distance between valleys is very nearly equal to π. There is a problem in defining points of maxima and minima in the curves presented, since the curves are monotonically increasing; however, one can isolate certain sections of the curves and observe maxima and minima in these sections.

We tabulate in the appendices the computations required to obtain the curves shown in Fig. 1. Table I contains the actual plotted points.

III

FIGURE I

MAGNETIC FIELD DEPENDENCE OF THE ATTENUATION.

ORDINATE: $Re\,[\alpha'(X_F)]\,/\,\frac{m}{n\,C_g\,\tau}$

ABSCISSA: X_F

(All curves were obtained by computation at the points indicated on the curve for $q\ell=3$.)

$q\ell=\infty$

$q\ell=15$

$q\ell=11$

$q\ell=7$

$q\ell=3$

$Re\,[\alpha'(X_F)]\,/\,\frac{m}{n\,C_g\,\tau}$

X_F

6
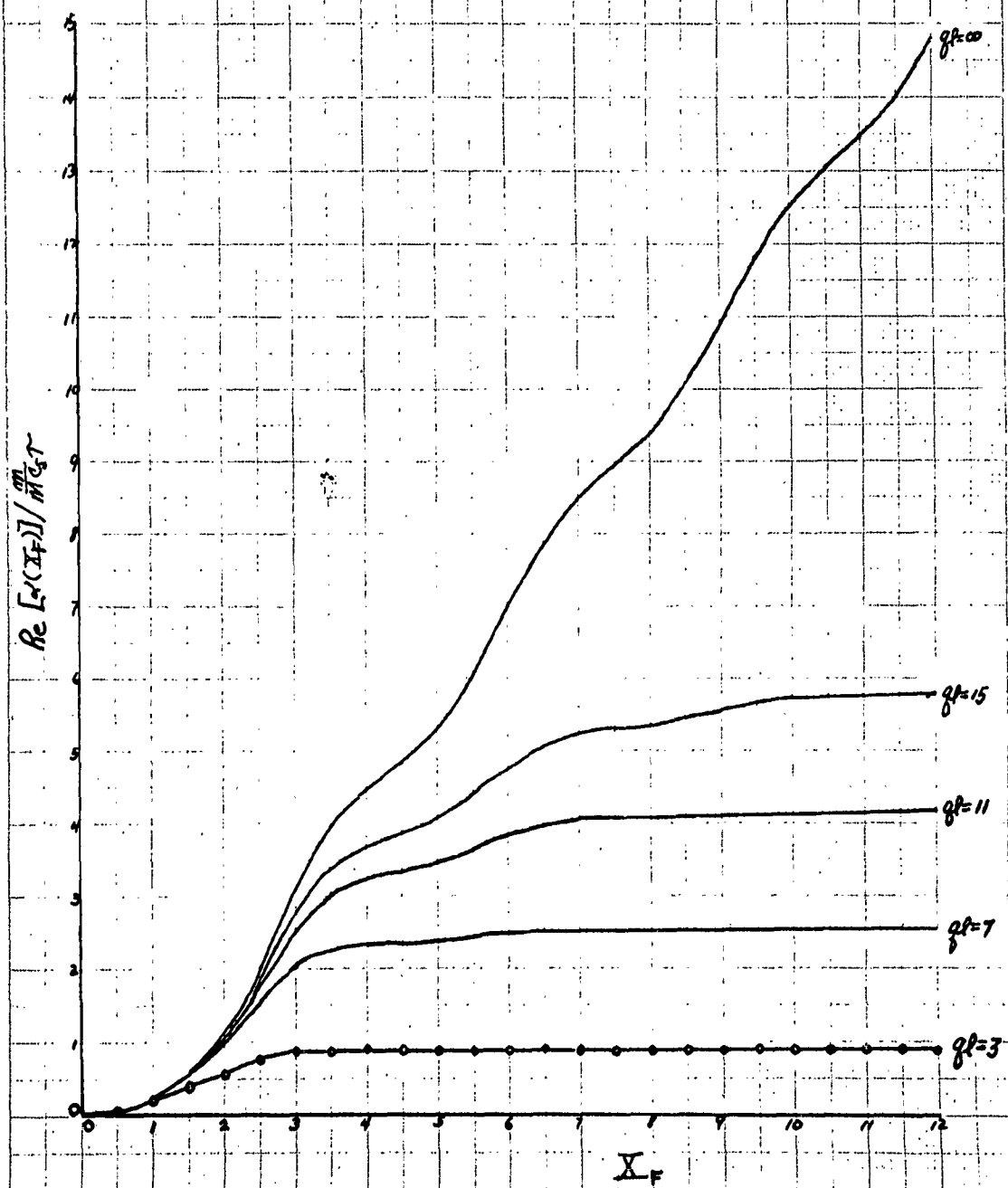
X_F	$\sigma/3\sigma_0$ $(q\ell=3)$	$Re\ \alpha(I_F)/\frac{m}{mc_s\tau}$ $(q\ell=3)$
0.0	0. 333 333 333	0. 000 000 000
0.5	0. 317 541 907	0. 049 730 211
1.0	0. 279 221 421	0. 193 795 705
1.5	0. 237 185 981	0. 405 366 927
2.0	0. 209 673 585	0. 589 772 661
2.5	0. 187 671 230	0. 776 155 744
3.0	0. 180 149 269	0. 850 317 435
3.5	0. 177 923 677	0. 873 462 480
4.0	0. 177 520 664	0. 877 715 674
4.5	0. 177 389 950	0. 879 099 313
5.0	0. 177 165 011	0. 881 485 127
5.5	0. 176 894 144	0. 884 366 128
6.0	0. 176 667 383	0. 886 784 802
6.5	0. 176 507 776	0. 888 490 925
7.0	0. 176 401 137	0. 889 632 567
7.5	0. 176 322 914	0. 890 470 873
8.0	0. 176 134 072	0. 892 497 740
8.5	0. 176 197 214	0. 891 819 545
9.0	0. 176 148 015	0. 892 347 940
9.5	0. 176 107 778	0. 892 780 302
10.0	0. 176 071 130	0. 893 174 271
10.5	0. 176 041 090	0. 893 497 326
11.0	0. 176 015 163	0. 893 776 238
11.5	0. 175 992 466	0. 894 020 470
12.0	0. 175 972 554	0. 894 234 786

TABLE I (Con't.) 8

X_F	$\sigma/3\sigma_0$ $(q'=7)$	$R_6 d(I_F)/\frac{m}{mc5r}$ $(q'=7)$
0.0	0. 333 333 333	0. 000 000 000
0.5	0. 317 188 085	0. 050 901 181
1.0	0. 274 552 107	0. 214 098 616
1.5	0. 219 772 661	0. 516 718 830
2.0	0. 169 437 629	0. 967 292 243
2.5	0. 131 453 708	1. 535 746 905
3.0	0. 110 651 377	2. 012 464 393
3.5	0. 102 256 455	2. 259 777 911
4.0	0. 100 165 116	2. 327 838 539
4.5	0. 099 621 188	2. 346 008 414
5.0	0. 098 553 645	2. 382 252 714
5.5	0. 096 957 568	2. 437 930 016
6.0	0. 095 548 073	2. 488 645 274
6.5	0. 094 771 374	2. 517 236 474
7.0	0. 094 560 001	2. 525 098 665
7.5	0. 094 583 148	2. 524 235 980
8.0	0. 094 572 218	2. 524 643 287
8.5	0. 094 455 250	2. 529 008 004
9.0	0. 094 298 881	2. 534 859 902
9.5	0. 094 186 736	2. 539 068 742
10.0	0. 094 143 134	2. 540 707 847
10.5	0. 094 142 624	2. 540 727 028
11.0	0. 094 144 997	2. 540 637 781
11.5	0. 094 139 938	2. 540 828 052
12.0	0. 094 104 214	2. 542 172 227

TABLE I   (Con't.)

X_F	$\sigma/3\sigma_0$ $(q\ell=11)$	$Re\,\alpha(I_F)/\frac{m}{Mc_{ST}}$ $(q\ell=11)$
0.0	0. 333 333 333	0. 000 000 000
0.5	0. 317 139 501	0. 051 062 173
1.0	0. 273 863 673	0. 217 150 597
1.5	0. 216 922 001	0. 536 650 647
2.0	0. 162 118 525	1. 056 108 845
2.5	0. 119 679 190	1. 785 223 841
3.0	0. 094 375 415	2. 531 993 298
3.5	0. 082 880 323	3. 021 863 347
4.0	0. 079 028 110	3. 217 908 454
4.5	0. 077 299 968	3. 312 205 321
5.0	0. 074 921 859	3. 449 079 851
5.5	0. 071 747 564	3. 645 918 477
6.0	0. 068 826 911	3. 843 066 883
6.5	0. 066 982 152	3. 976 450 044
7.0	0. 066 423 231	4. 018 324 587
7.5	0. 065 998 620	4. 050 610 654
8.0	0. 065 758 084	4. 069 085 244
8.5	0. 065 305 466	4. 104 217 973
9.0	0. 064 772 229	4. 146 238 418
9.5	0. 064 372 348	4. 178 206 849
10.0	0. 064 193 292	4. 192 650 555
10.5	0. 064 165 300	4. 194 915 839
11.0	0. 064 158 535	4. 195 463 601
11.5	0. 064 095 852	4. 200 544 542
12.0	0. 063 987 166	4. 209 377 976

TABLE I   (Con't.)   10

X_F	$\sigma/3\sigma_0$ $(q\ell=15)$	$Re\, \alpha(X_F)/\frac{m}{MC_{ST}}$ $(q\ell=15)$
0.0	0. 333 333 333	0. 000 000 000
0.5	0. 317 124 157	0. 051 113 029
1.0	0. 273 643 699	0. 218 129 028
1.5	0. 215 993 923	0. 543 253 294
2.0	0. 159 683 391	1. 087 464 020
2.5	0. 115 636 152	1. 882 604 856
3.0	0. 085 031 928	2. 761 691 218
3.5	0. 075 809 091	3. 397 010 027
4.0	0. 071 093 400	3. 688 667 771
4.5	0. 068 693 242	3. 852 490 923
5.0	0. 065 552 423	4. 084 988 747
5.5	0. 061 446 732	4. 424 752 830
6.0	0. 057 573 415	4. 789 709 249
6.5	0. 054 960 948	5. 064 912 368
7.0	0. 053 699 109	5. 207 427 637
7.5	0. 053 143 692	5. 272 302 897
8.0	0. 052 585 968	5. 338 826 611
8.5	0. 051 757 406	5. 440 302 153
9.0	0. 050 811 755	5. 560 161 784
9.5	0. 050 063 842	5. 658 165 254
10.0	0. 049 661 174	5. 712 151 696
10.5	0. 049 510 542	5. 732 572 899
11.0	0. 049 409 025	5. 746 405 810
11.5	0. 049 223 404	5. 771 846 443
12.0	0. 048 963 504	5. 807 791 642

TABLE I   (Con't.)   11

x_F	$\sigma/3\sigma_0$ $(q\ell=\infty)$	$Re\,\alpha(x_F)/\frac{m}{m_c s}\tau$ $(q\ell=\infty)$
0.0	0. 333 333 333	0. 000 000 000
0.5	0. 317 106 269	0. 051 172 322
1.0	0. 273 385 667	0. 219 278 746
1.5	0. 214 894 401	0. 551 149 456
2.0	0. 156 763 851	1. 126 340 551
2.5	0. 110 702 286	2. 011 079 042
3.0	0. 081 451 231	3. 092 428 429
3.5	0. 066 852 651	3. 986 089 980
4.0	0. 060 848 254	4. 478 108 432
4.5	0. 057 358 432	4. 811 409 442
5.0	0. 052 940 111	5. 296 423 015
5.5	0. 047 231 244	6. 057 475 202
6.0	0. 041 623 793	7. 008 240 222
6.5	0. 037 470 534	7. 895 878 914
7.0	0. 035 028 603	8. 516 032 749
7.5	0. 033 545 414	8. 936 778 044
8.0	0. 032 053 108	9. 399 407 549
8.5	0. 030 099 110	10. 074 524 573
9.0	0. 027 904 243	10. 945 614 626
9.5	0. 025 983 416	11. 828 695 554
10.0	0. 024 646 010	12. 524 839 652
10.5	0. 023 780 906	13. 016 847 521
11.0	0. 023 023 101	13. 478 211 833
11.5	0. 022 086 660	14. 092 066 131
12.0	0. 020 966 886	14. 898 084 881

V

APPENDIX A

DESCRIPTION OF CALCULATIONS

The function $r_n(X_F)$ appearing Eq. (1) is evaluated from

$$r_n(X_F) = (\frac{1}{2} + \frac{1-4n^2}{8 X_F}) g_n(X_F) - \frac{1}{8 X_F^2} J_{2n}(2X_F) + \frac{1}{8 X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F)) \quad \text{(A-1)}$$

where

$$g_n(X_F) = X_F^{-1} \sum_{m=0}^{\infty} J_{2m+2n+1}(2X_F) \quad \text{(A-2)}$$

Equation (A-1) is essentially identical to Eq. (A1) of CHH.

Col. (I) of the tabulated calculations contains the values of $X_F g_n(X_F)$ for $X_F = 0, \frac{1}{2}, 1, \frac{3}{2} \ldots 12$. The first term of Eq. (A-1) is then obtained by multiplying the values $(\frac{1}{2} + \frac{1-4n^2}{8 X_F}) \frac{1}{X_F}$, (Col. (II)), by the corresponding terms of Col. (I), the results are tabulated in Col. (III). Cols. (IV) and (V) contain the terms $-\frac{1}{8 X_F^2} J_{2n}(2X_F)$ and $\frac{1}{8 X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$ respectively. Summing Cols. (III), (IV) and (V) we obtain $r_n(X_F)$, tabulated in Col. (VI).

To obtain the attenuation we must calculate the ratio $r_n(X_F)/1+(q1)^2 \frac{n^2}{X_F^2}$ for $q1 = 3, 7, 11, 15$; values of this ratio are contained in Cols. (VIII), (X), (XII) and (XIV), with the values $1+(q1)^2 n^2/X_F^2$ tabulated in Cols. (VII),

(IX), (XI) and (XIII). It should be noted that the above ratio for ql=∞ is non-zero only for n=o.

The ratio of $\sigma/3\sigma_0$ (see Eq. (1)) consists in performing a summation of the Cols. (VIII), (X), (XII) and (XIV). These results are tabulated in Table I. A calculation of the relative attenuation Re $\lfloor \alpha(X_F) \rfloor / \frac{m}{mc_s\tau}$ is obtained by subtracting one (1) from the reciprocal of $\sigma/\oint\sigma_0$; this is also tabulated in Table I.

Computations were performed retaining nine places; one can expect the attenuation to have five significant figures when its numerical value is of the order of magnitude of a tenth, and less than five significant figures when the order of magnitude is less than a tenth.

Bessel functions in a form most suitable for the numerical evaluation of the above equations were found in Ref. (5).

		I	II	III
		$X_F\, g_n(X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II
X_F	n			
	0	0. 459 865 202	2	+ 0. 919 730 404
	1	0. 019 814 617	- 2	- 0. 039 629 234
	2	0. 000 251 264	- 14	- 0. 003 517 696
0.5	3	0. 000 001 507	- 34	- 0. 000 051 238
	4	0. 000 000 005	- 62	- 0. 000 000 310
X_F	0	0. 712 885 144	5/8	+ 0. 445 553 215
	1	0. 136 160 337	1/8	+ 0. 017 020 042
	2	0. 007 217 088	- 11/8	- 0. 009 923 496
	3	0. 000 177 459	- 31/8	- 0. 000 687 653
1.0	4	0. 000 002 515	- 59/8	- 0. 000 018 548
	5	0. 000 000 023	- 95/8	- 0. 000 000 273
	6	0. 000 000 000	- 139/8	0. 000 000 000
X_F	0	0. 693 783 622	10/27	+ 0. 256 956 897
	1	0. 354 724 664	6/27	+ 0. 078 827 703
	2	0. 045 661 942	- 6/27	- 0. 010 147 098
	3	0. 002 633 508	- 26/27	- 0. 002 535 970
1.5	4	0. 000 086 214	- 54/27	- 0. 000 172 428
	5	0. 000 001 819	- 90/27	- 0. 000 006 063
	6	0. 000 000 026	- 134/27	- 0. 000 000 129
	7	0. 000 000 000		0. 000 000 000

		I	II	III
		$X_F \, g_n (X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col I x Col. II
X_F	n			
	0	0. 512 367 075	17/64	+ 0. 136 097 504
	1	0. 578 410 403	13/64	+ 0. 117 489 613
	2	0. 148 238 930	1/64	+ 0. 023 162 332
2.0	3	0. 016 152 274	- 19/64	- 0. 004 795 206
	4	0. 000 976 205	- 47/64	- 0. 000 716 900
	5	0. 000 037 604	- 83/64	- 0. 000 048 767
	6	0. 000 001 004	- 127/64	- 0. 000 001 992
	7	0. 000 000 019	- 179/64	- 0. 000 000 053
	8	0. 000 000 000	- 239/64	0. 000 000 000
	0	0. 357 655 956	26/125	+ 0. 074 392 438
	1	0. 685 235 093	22/125	+ 0. 120 601 376
	2	0. 320 403 863	10/125	+ 0. 025 632 309
2.5	3	0. 059 263 317	- 10/125	- 0. 004 741 065
	4	0. 005 886 907	- 38/125	- 0. 001 789 619
	5	0. 000 366 624	- 74/125	- 0. 000 217 041
	6	0. 000 015 697	- 118/125	- 0. 000 014 817
	7	0. 000 000 490	- 170/125	- 0. 000 000 666
	8	0. 000 000 011	- 230/125	- 0. 000 000 020
	9	0. 000 000 000		0. 000 000 000

		I $X_F\, g_n\,(X_F)$	II $\left[\dfrac{1}{2}+\dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	III Col. I x Col. II
X_F	n			
	0	0. 353 110 606	37/216	+ 0. 060 486 538
	1	0. 629 794 464	33/216	+ 0. 096 218 598
	2	0. 515 026 080	21/216	+ 0. 050 071 980
	3	0. 152 939 006	1/216	+ 0. 000 708 050
3.0	4	0. 023 352 355	- 27/216	- 0. 002 919 044
	5	0. 002 187 032	- 63/216	- 0. 000 637 884
	6	0. 000 139 086	- 109/216	- 0. 000 070 186
	7	0. 000 006 415	- 159/216	- 0. 000 004 722
	8	0. 000 000 224	- 219/216	- 0. 000 000 227
	9	0. 000 000 006	- 287/216	- 0. 000 000 007
	10	0. 000 000 000	- 363/216	0. 000 000 000
	0	0. 477 320 154	50/343	+ 0. 069 580 197
	1	0. 482 002 977	46/343	+ 0. 064 641 798
	2	0. 649 558 564	34/343	+ 0. 064 387 729
	3	0. 301 662 240	14/343	+ 0. 012 312 744
3.5	4	0. 068 078 671	- 14/343	- 0. 002 778 721
	5	0. 009 158 163	- 50/343	- 0. 001 335 009
	6	0. 000 823 402	- 94/343	- 0. 000 225 655
	7	0. 000 053 181	- 146/343	- 0. 000 022 636
	8	0. 000 002 591	- 206/343	- 0. 000 001 556
	9	0. 000 000 097	- 274/343	- 0. 000 000 077
	10	0. 000 000 002	- 350/343	- 0. 000 000 002
	11	0. 000 000 000		0. 000 000 000

		I	II	III
		$X_F\, g_n\,(X_F)$	$\left[\frac{1}{2} + \frac{1-4n^2}{8X_F^2}\right]\frac{1}{X_F}$	Col. I x Col. II
X_F	n			
	0	0. 605 373 413	65/512	+ 0. 076 854 046
	1	0. 370 737 067	61/512	+ 0. 044 169 845
	2	0. 661 869 274	49/512	+ 0. 063 342 957
	3	0. 476 094 502	29/512	+ 0. 026 966 290
4.0	4	0. 155 505 425	1/512	+ 0. 000 303 721
	5	0. 029 184 531	- 35/512	- 0. 001 995 036
	6	0. 003 587 859	- 79/512	- 0. 000 553 595
	7	0. 000 313 066	- 131/512	- 0. 000 080 100
	8	0. 000 020 463	- 191/512	- 0. 000 007 633
	9	0. 000 001 041	- 259/512	- 0. 000 000 526
	10	0. 000 000 042	- 335/512	- 0. 000 000 027
	11	0. 000 000 001	- 419/512	0. 000 000 000
	12	0. 000 000 000	- 511/512	0. 000 000 000
	0	0. 626 133 219	82/729	+ 0. 070 429 250
	1	0. 380 821 433	78/729	+ 0. 040 746 326
	2	0. 561 756 623	66/729	+ 0. 050 858 624
	3	0. 616 795 478	46/729	+ 0. 038 919 879
4.5	4	0. 289 334 599	18/729	+ 0. 007 144 064
	5	0. 074 454 017	- 18/729	- 0. 001 838 370
	6	0. 012 236 616	- 62/729	- 0. 001 040 699
	7	0. 001 406 315	- 114/729	- 0. 000 219 917
	8	0. 000 119 930	- 174/729	- 0. 000 028 625

		I	II	III
		$X_F \, g_n (X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II
X_F	n			
	9	0. 000 007 912	– 242/729	– 0. 000 002 626
	10	0. 000 000 415	– 318/729	– 0. 000 000 181
4.5	11	0. 000 000 017	– 402/729	– 0. 000 000 009
	12	0. 000 000 000		0. 000 000 000
	0	0. 533 505 648	101/1000	+ 0. 053 884 070
	1	0. 490 030 902	97/1000	+ 0. 047 533 191
	2	0. 431 653 523	85/1000	+ 0. 036 690 549
	3	0. 665 715 051	65/1000	+ 0. 043 271 478
5.0	4	0. 449 004 134	37/1000	+ 0. 016 613 152
	5	0. 157 148 449	1/1000	+ 0. 000 157 148
	6	0. 034 031 921	– 43/1000	– 0. 001 463 372
	7	0. 005 059 838	– 95/1000	– 0. 000 480 684
	8	0. 000 551 865	– 155/1000	– 0. 000 085 539
	9	0. 000 046 219	– 223/1000	– 0. 000 010 306
	10	0. 000 003 073	– 299/1000	– 0. 000 000 918
	11	0. 000 000 166	– 383/1000	– 0. 000 000 063
	12	0. 000 000 007	– 475/1000	– 0. 000 000 003
	13	0. 000 000 000		0. 000 000 000
	0	0. 419 899 435	122/1331	+ 0. 038 488 152
	1	0. 596 684 733	118/1331	+ 0. 052 899 172
5.5	2	0. 369 336 700	106/1331	+ 0. 029 413 741
	3	0. 607 622 551	86/1331	+ 0. 039 260 360

		I	II	III
		$X_F \, g_n(X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II
X_F	n			
	4	0. 589 246 519	58/1331	+ 0. 025 677 158
	5	0. 280 391 019	22/1331	+ 0. 004 634 562
	6	0. 079 377 010	- 22/1331	- 0. 001 312 016
	7	0. 015 082 389	- 74/1331	- 0. 000 838 540
5.5	8	0. 002 073 298	- 134/1331	- 0. 000 208 731
	9	0. 000 216 866	- 202/1331	- 0. 000 032 912
	10	0. 000 017 897	- 278/1331	- 0. 000 003 738
	11	0. 000 001 196	- 362/1331	- 0. 000 000 325
	12	0. 000 000 065	- 454/1331	- 0. 000 000 022
	13	0. 000 000 002	- 554/1331	0. 000 000 000
	14	0. 000 000 000		
	0	0. 387 061 090	145/1728	+ 0. 032 479 084
	1	0. 610 508 194	141/1728	+ 0. 049 815 772
	2	0. 415 371 255	129/1728	+ 0. 031 008 617
	3	0. 488 842 218	109/1728	+ 0. 030 835 533
6.0	4	0. 659 096 022	81/1728	+ 0. 030 895 126
	5	0. 428 715 113	45/1728	+ 0. 011 164 456
	6	0. 158 302 631	1/1728	+ 0. 000 091 610
	7	0. 038 154 749	- 51/1728	- 0. 001 126 095
	8	0. 006 542 095	- 111/1728	- 0. 000 420 238
	9	0. 000 844 335	- 179/1728	- 0. 000 087 462
	10	0. 000 085 347	- 255/1728	- 0. 000 012 594
	11	0. 000 006 958	- 339/1728	- 0. 000 001 365

		I	II	III
		$X_F\, g_n\,(X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col I x Col. II

X_F	n	I	II	III
	12	0. 000 000 467	$-$ 431/1728	$-$ 0. 000 000 116
6.0	13	0. 000 000 026	$-$ 531/1728	$-$ 0. 000 000 007
	14	0. 000 000 001	$-$ 639/1728	$-$ 0. 000 000 000
	15	0. 000 000 000		
	0	0. 457 211 234	170/2197	$+$ 0. 035 378 201
	1	0. 527 529 286	166/2197	$+$ 0. 039 858 835
	2	0. 524 209 470	154/2197	$+$ 0. 036 744 769
6.5	3	0. 392 589 911	134/2197	$+$ 0. 023 944 946
	4	0. 633 160 860	106/2197	$+$ 0. 030 548 498
	5	0. 566 184 662	70/2197	$+$ 0. 018 039 565
	6	0. 273 496 230	26/2197	$+$ 0. 003 236 641
	7	0. 083 347 354	$-$ 26/2197	$-$ 0. 000 986 359
	8	0. 017 703 573	$-$ 87/2197	$-$ 0. 000 701 051
	9	0. 002 794 068	$-$ 154/2197	$-$ 0. 000 195 851
	10	0. 000 342 385	$-$ 230/2197	$-$ 0. 000 035 843
	11	0. 000 033 636	$-$ 314/2197	$-$ 0. 000 004 807
	12	0. 000 002 714	$-$ 406/2197	$-$ 0. 000 000 501
	13	0. 000 000 183	$-$ 506/2197	$-$ 0. 000 000 042
	14	0. 000 000 010	$-$ 614/2197	$-$ 0. 000 000 002
	15	0. 000 000 000		0. 000 000 000

		I	II	III
		$X_F \, g_n \, (X_F)$	$\left[\frac{1}{2} + \frac{1-4n^2}{8X_F^2}\right]\frac{1}{X_F}$	Col. I x Col. II
X_F	n			
	0	0. 560 338 910	197/2744	+ 0. 040 228 412
	1	0. 426 963 756	193/2744	+ 0. 030 030 614
	2	0. 603 773 162	181/2744	+ 0. 039 826 145
	3	0. 383 395 514	161/2744	+ 0. 022 495 144
	4	0. 534 200 433	133/2744	+ 0. 025 .892 367
7.0	5	0. 648 507 631	97/2744	+ 0. 022 924 650
	6	0. 412 762 283	53/2744	+ 0. 007 972 449
	7	0. 159 164 310	1/2744	+ 0. 000 058 004
	8	0. 041 727 497	- 59/2744	- 0. 000 897 202
	9	0. 008 003 348	- 127/2744	- 0. 000 370 417
	10	0. 001 179 708	- 203/2744	- 0. 000 087 274
	11	0. 000 138 421	- 287/2744	- 0. 000 014 477
	12	0. 000 013 273	- 379/2744	- 0. 000 001 833
	13	0. 000 001 060	- 479/2744	- 0. 000 000 185
	14	0. 000 000 070	- 587/2744	- 0. 000 000 014
	15	0. 000 000 003	- 703/2744	- 0. 000 000 000
	16	0. 000 000 000		
	0	0. 602 580 962	226/3375	+ 0. 040 350 606
	1	0. 397 476 924	222/3375	+ 0. 026 145 148
7.5	2	0. 591 495 181	210/3375	+ 0. 036 804 144
	3	0. 461 039 047	190/3375	+ 0. 025 954 790
	4	0. 426 575 392	162/3375	+ 0. 020 475 618

		I	II	III
		$X_F \, \varepsilon_n (X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II
X_F	n			
	5	0. 646 621 617	126/3375	+ 0. 024 140 540
	6	0. 546 671 140	82/3375	+ 0. 013 282 083
	7	0. 267 956 267	30/3375	+ 0. 002 381 833
	8	0. 086 649 926	- 30/3375	- 0. 000 770 221
	9	0. 020 121 076	- 98/3375	- 0. 000 584 256
	10	0. 003 547 570	- 174/3375	- 0. 000 182 896
7.5	11	0. 000 493 786	- 258/3375	- 0. 000 037 747
	12	0. 000 055 841	- 350/3375	- 0. 000 005 790
	13	0. 000 005 244	- 450/3375	- 0. 000 000 699
	14	0. 000 000 415	- 558/3375	- 0. 000 000 068
	15	0. 000 000 027	- 674/3375	- 0. 000 000 005
	16	0. 000 000 001	- 798/3375	0. 000 000 000
	17	0. 000 000 000		
X 0.	0.	0. 550 432 596	257/4096	+ 0. 034 536 420
	1	0. 460 035 421	253/4096	+ 0. 028 415 273
	2	0. 503 882 916	241/4096	+ 0. 029 647 407
	3	0. 561 356 186	221/4096	+ 0. 030 288 016
8.0	4	0. 378 842 363	193/4096	+ 0. 017 850 726
	5	0. 568 377 328	157/4096	+ 0. 021 785 947
	6	0. 636 599 480	113/4096	+ 0. 017 562 436
	7	0. 399 776 976	61/4096	+ 0. 005 953 709
	8	0. 159 835 894	1/4096	+ 0. 000 039 022
	9	0. 044 870 590	- 67/4096	- 0. 000 733 967
	10	0. 009 427 716	- 143/4096	- 0. 000 329 141

		I	II	III
		$X_F\, g_n\,(X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II

X	n			
	11	0. 001 548 725	- 227/4096	- 0. 000 085 830
	12	0. 000 205 299	- 319/4096	- 0. 000 015 988
8.0	13	0. 000 022 491	- 419/4096	- 0. 000 002 300
	14	0. 000 002 073	- 527/4096	- 0. 000 000 267
	15	0. 000 000 162	- 643/4096	- 0. 000 000 025
	16	0. 000 000 010	- 767/4096	- 0. 000 000 002
	17	0. 000 000 000	- 899/4096	- 0. 000 000 000
	18	0. 000 000 000		- 0. 000 000 000

X_F	n			
	0	0. 456 276 133	290/4913	+ 0. 026 932 643
	1	0. 553 944 625	286/4913	+ 0. 032 246 725
	2	0. 419 014 052	074/4913	+ 0. 023 368 583
	3	0. 606 058 171	254/4913	+ 0. 031 332 948
	4	0. 418 509 111	226/4913	+ 0. 019 251 589
	5	0. 461 364 680	190/4913	+ 0. 017 842 314
8.5	6	0. 652 760 074	146/4913	+ 0. 019 398 121
	7	0. 529 940 922	94/4913	+ 0. 010 139 313
	8	0. 263 369 189	34/4913	+ 0. 001 822 624
	9	0. 089 461 279	- 34/4913	- 0. 000 619 109
	10	0. 022 357 639	- 110/4913	- 0. 000 500 578
	11	0. 004 319 249	- 194/4913	- 0. 000 170 554
	12	0. 000 668 044	- 286/4913	- 0. 000 038 888
	13	0. 000 084 909	- 386/4913	- 0. 000 006 671

		I			II	III		
		$X_F \, g_n \, (X_F)$			$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II		

X_F	n							
	14	0.	000	009 049	− 494/4913	− 0.	000	000 909
	15	0.	000	000 821	− 610/4913	− 0.	000	000 101
8.5	16	0.	000	000 064	− 734/4913	− 0.	000	000 009
	17	0.	000	000 004	− 866/4913	0.	000	000 000
	18	0.	000	000 000				
X	0	0.	406	652 858	325/5832	+ 0.	022	661 553
	1	0.	594	647 743	321/5832	+ 0.	032	730 096
	2	0.	408	326 750	309/5832	+ 0.	021	634 596
	3	0.	563	696 848	289/5832	+ 0.	027	933 537
	4	0.	512	297 573	261/5832	+ 0.	022	926 897
	5	0.	389	533 784	225/5832	+ 0.	015	028 309
	6	0.	593	597 194	181/5832	+ 0.	018	422 683
	7	0.	624	522 018	129/5832	+ 0.	013	814 015
9.0	8	0.	388	929 661	69/5832	+ 0.	004	601 534
	9	0.	160	376 341	1/5832	+ 0.	000	027 499
	10	0.	047	669 895	− 75/5832	− 0.	000	613 038
	11	0.	010	807 569	− 159/5832	− 0.	000	294 650
	12	0.	001	943 759	− 251/5832	− 0.	000	083 656
	13	0.	000	285 402	− 351/5832	− 0.	000	017 176
	14	0.	000	034 968	− 459/5832	− 0.	000	002 752
	15	0.	000	003 636	− 375/5832	− 0.	000	000 358
	16	0.	000	000 324	− 699/5832	− 0.	000	000 038
	17	0.	000	000 024	− 831/5832	− 0.	000	000 003
	18	0.	000	000 001	− 971/5832	0.	000	000 000

	I	II	III
	X_F $g_n(X_F)$	$\left[\frac{1}{2} + \frac{1-4n^2}{8x_F^2}\right]\frac{1}{X_F}$	Col. I x Col. II

X_F	n			
0.	0.	0. 443 464 430	362/6859	+ 0. 023 404 887
	1	0. 549 165 861	358/6859	+ 0. 028 663 271
	2	0. 476 676 200	346/6859	+ 0. 024 045 774
	3	0. 473 103 808	326/6859	+ 0. 022 486 053
	4	0. 589 581 782	298/6859	+ 0. 025 615 304
	5	0. 394 837 454	262/6859	+ 0. 015 081 996
	6	0. 493 209 854	218/6859	+ 0. 015 675 717
	7	0. 654 363 621	166/6859	+ 0. 015 836 763
9.5	8	0. 515 415 315	106/6859	+ 0. 007 965 304
	9	0. 259 483 531	38/6859	+ 0. 001 437 581
	10	0. 091 897 788	- 38/6859	- 0. 000 509 129
	11	0. 024 434 380	- 122/6859	- 0. 000 434 610
	12	0. 005 099 007	- 214/6859	- 0. 000 159 088
	13	0. 000 862 175	- 314/6859	- 0. 000 039 469
	14	0. 000 120 983	- 422/6859	- 0. 000 007 443
	15	0. 000 014 353	- 538/6859	- 0. 000 001 125
	16	0. 000 001 460	- 662/6859	- 0. 000 000 140
	17	0. 000 000 128	- 794/6859	- 0. 000 000 014
	18	0. 000 000 009	- 934/6859	- 0. 000 000 001
	19	0. 000 000 000		

	I	II	III
	$X_F g_n(X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Co. I x Col. II

X_F	n			
	0	0. 529 189 404	401/8000	+ 0. 026 525 618
	1	0. 462 356 280	397/8000	+ 0. 022 944 430
	2	0. 561 257 674	385/8000	+ 0. 027 010 525
	3	0. 410 087 907	365/8000	+ 0. 018 710 260
	4	0. 594 309 304	337/8000	+ 0. 025 035 279
	5	0. 469 183 050	301/8000	+ 0. 017 653 012
	6	0. 407 826 747	257/8000	+ 0. 013 101 434
	7	0. 611 971 799	205/8000	+ 0. 015 681 777
	8	0. 612 783 868	145/8000	+ 0. 011 106 707
	9	0. 379 684 055	77/8000	+ 0. 003 654 459
10.0	10	0. 160 822 152	1/8000	+ 0. 000 020 102
	11	0. 050 188 508	− 83/8000	− 0. 000 520 705
	12	0. 012 139 819	− 175/8000	− 0. 000 265 558
	13	0. 002 358 654	− 275/8000	− 0. 000 081 078
	14	0. 000 377 919	− 383/8000	− 0. 000 018 092
	15	0. 000 050 956	− 499/8000	− 0. 000 003 178
	16	0. 000 005 874	− 623/8000	− 0. 000 000 457
	17	0. 000 000 585	− 755/8000	− 0. 000 000 055
	18	0. 000 000 050	− 895/8000	− 0. 000 000 005
	19	0. 000 000 003	− 1043/8000	0. 000 000 000
	20	0. 000 000 000		

	I	II	III
	$X_F\, g_n\,(X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II

X_F n			
0	0. 584 504 682	442/9261	+ 0. 027 896 670
1	0. 413 384 410	438/9261	+ 0. 019 551 060
2	0. 588 367 902	426/9261	+ 0. 027 064 542
3	0. 424 703 794	406/9261	+ 0. 018 618 911
4	0. 526 854 376	378/9261	+ 0. 021 504 260
5	0. 558 607 838	342/9261	+ 0. 020 628 860
6	0. 385 395 513	298/9261	+ 0. 012 401 23?
7	0. 520 975 008	246/9261	+ 0. 013 836 662
8	0. 653 114 250	186/9261	+ 0. 013 117 293
9	0. 502 660 787	118/9261	+ 0. 006 404 704
10.5 10	0. 256 132 626	42/9261	+ 0. 001 161 599
11	0. 094 039 905	- 42/9261	- 0. 000 426 484
12	0. 026 369 909	- 134/9261	- 0. 000 381 553
13	0. 005 879 820	- 234/9261	- 0. 000 148 566
14	0. 001 073 422	- 342/9261	- 0. 000 039 640
15	0. 000 164 033	- 458/9261	- 0. 000 008 112
16	0. 000 021 348	- 582/9261	- 0. 000 001 341
17	0. 000 002 398	- 714/9261	- 0. 000 000 184
18	0. 000 000 234	- 854/9261	- 0. 000 000 021
19	0. 000 000 019	- 1002/9261	- 0. 000 000 002
20	0. 000 000 001	- 1158/9261	0. 000 000 000
21	0. 000 000 000		

	I	II	III
	$X_F \, g_n \, (X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II

X_F n			
0	0. 561 195 556	485/10648	+ 0. 025 561 593
1	0. 444 017 767	481/10648	+ 0. 020 057 526
2	0. 537 322 101	469/10648	+ 0. 023 666 798
3	0. 501 017 999	449/10648	+ 0. 021 126 698
4	0. 442 820 736	421/10648	+ 0. 017 508 220
5	0. 600 085 549	385/10648	+ 0. 021 697 308
6	0. 435 960 126	341/10648	+ 0. 013 961 532
7	0. 429 272 365	289/10648	+ 0. 011 650 987
8	0. 625 182 897	229/10648	+ 0. 013 445 424
9	0. 601 600 644	161/10648	+ 0. 009 096 328
10	0. 371 675 819	85/10648	+ 0. 002 966 983
11.0 11	0. 161 197 213	1/10648	+ 0. 000 015 138
12	0. 052 474 007	- 91/10648	- 0. 000 448 453
13	0. 013 423 902	- 191/10648	- 0. 000 240 793
14	0. 002 788 469	- 299/10648	- 0. 000 078 301
15	0. 000 481 922	- 415/10648	- 0. 000 018 782
16	0. 000 070 612	- 539/10648	- 0. 000 003 574
17	0. 000 008 902	- 671/10648	- 0. 000 000 560
18	0. 000 000 976	- 811/10648	- 0. 000 000 074
19	0. 000 000 093	- 959/10648	- 0. 000 000 008
20	0. 000 000 007	- 1115/10648	0. 000 000 000
21	0. 000 000 000		

	I	II	III
	$X_F\, g_n\,(X_F)$	$\left[\dfrac{1}{2} + \dfrac{1-4n^2}{8X_F^2}\right]\dfrac{1}{X_F}$	Col. I x Col. II

X_F n			
0	0. 483 788 300	530/12167	+ 0. 021 074 036
1	0. 523 307 621	526/12167	+ 0. 022 623 474
2	0. 456 140 244	514/12167	+ 0. 019 269 835
3	0. 572 509 149	494/12167	+ 0. 023 244 803
4	0. 408 735 435	466/12167	+ 0. 015 654 698
5	0. 566 367 146	430/12167	+ 0. 020 016 263
6	0. 523 685 938	386/12167	+ 0. 016 614 019
7	0. 385 826 018	334/12167	+ 0. 010 591 426
8	0. 544 596 986	274/12167	+ 0. 012 264 286
9	0. 650 056 466	206/12167	+ 0. 011 006 113
10	0. 491 349 837	130/12167	+ 0. 005 249 895
11.5 11	0. 253 200 917	46/12167	+ 0. 000 951 281
12	0. 095 945 376	- 46/12167	- 0. 000 362 742
13	0. 028 180 284	- 146/12167	- 0. 000 338 154
14	0. 006 656 784	- 254/12167	- 0. 000 138 967
15	0. 001 299 301	- 370/12167	- 0. 000 039 511
16	0. 000 213 901	- 494/12167	- 0. 000 008 684
17	0. 000 030 185	- 626/12167	- 0. 000 001 553
18	0. 000 003 698	- 766/12167	- 0. 000 000 232
19	0. 000 000 396	- 914/12167	- 0. 000 000 029
20	0. 000 000 036	- 1070/12167	- 0. 000 000 003
21	0. 000 000 002	- 1234/12167	- 0. 000 000 000
22	0. 000 000 000		

	$X_F g_n (X_F)$	$\left[\frac{1}{2} + \frac{1-4n^2}{8X_F^2}\right]\frac{1}{X_F}$	Col. I x Col. II
	I	**II**	**III**
X_F n			
0	0. 424 278 183	577/13824	+ 0. 017 708 949
1	0. 578 316 248	573/13824	+ 0. 023 971 007
2	0. 417 045 889	561/13824	+ 0. 016 924 388
3	0. 579 341 641	541/13824	+ 0. 022 672 441
4	0. 449 319 414	513/13824	+ 0. 016 673 962
5	0. 485 746 073	477/13824	+ 0. 016 760 769
6	0. 589 080 534	433/13824	+ 0. 018 451 379
7	0. 412 755 984	381/13824	+ 0. 011 375 870
8	0. 451 380 998	321/13824	+ 0. 010 481 286
9	0. 634 501 906	253/13824	+ 0. 011 612 339
12.0 10	0. 591 048 765	177/13824	+ 0. 007 567 681
11	0. 364 647 487	93/13824	+ 0. 002 453 140
12	0. 161 517 859	1/13824	+ 0. 000 011 683
13	0. 054 563 084	- 99/13824	- 0. 000 390 751
14	0. 014 660 657	- 207/13824	- 0. 000 219 528
15	0. 003 229 253	- 323/13824	- 0. 000 075 452
16	0. 000 596 456	- 447/13824	- 0. 000 019 286
17	0. 000 094 020	- 579/13824	- 0. 000 003 937
18	0. 000 012 826	- 719/13824	- 0. 000 000 667
19	0. 000 001 530	- 867/13824	- 0. 000 000 095
20	0. 000 000 160	- 1023/13824	- 0. 000 000 011
21	0. 000 000 014	- 1187/13824	- 0. 000 000 001
22	0. 000 000 001	- 1359/13824	- 0. 000 000 000
23	0. 000 000 000		

		IV $-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$	V $\dfrac{1}{8X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$	VI $r_n(X_F)$
X_F	n			
	0	− 0. 382 598 843	− 0. 220 025 292	0. 317 106 269
	1	− 0. 057 451 742	+ 0. 105 121 808	0. 008 040 832
	2	− 0. 001 238 319	+ 0. 004 828 399	0. 000 072 384
0.5	3	− 0. 000 010 469	+ 0. 000 062 063	0. 000 000 356
	4	− 0. 000 000 047	+ 0. 000 000 374	0. 000 000 017
	5	− 0. 000 000 000	+ 0. 000 000 001	0. 000 000 001
	6		0. 000 000 000	0. 000 000 000
	0	− 0. 027 986 347	− 0. 144 181 201	0. 273 385 667
	1	− 0. 044 104 253	+ 0. 055 972 694	0. 028 888 483
	2	− 0. 004 249 464	+ 0. 015 237 952	0. 001 064 992
1.0	3	− 0. 000 150 303	+ 0. 000 858 085	0. 000 020 129
	4	− 0. 000 002 772	+ 0. 000 021 556	0. 000 000 236
	5	− 0. 000 000 031	+ 0. 000 000 308	0. 000 000 004
	6	− 0. 000 000 000	+ 0. 000 000 002	0. 000 000 002
			0. 000 000 000	0. 000 000 000
	0	+ 0. 014 447 330	− 0. 056 509 826	0. 214 894 401
	1	− 0. 027 005 070	+ 0. 002 499 686	0. 054 322 319
	2	− 0. 007 335 232	+ 0. 022 169 524	0. 004 687 194
	3	− 0. 000 632 996	+ 0. 003 373 428	0. 000 204 462
1.5	4	− 0. 000 027 413	+ 0. 000 205 241	0. 000 005 400
	5	− 0. 000 000 718	+ 0. 000 006 883	0. 000 000 102
	6	− 0. 000 000 012	+ 0. 000 000 147	0. 000 000 006
	7	− 0. 000 000 000	+ 0. 000 000 002	0. 000 000 002
			+ 0. 000 000 000	0. 000 000 000

		$-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$			$\dfrac{1}{8X_F}\left(J_{2n-1}(2X_F) - J_{2n+1}(2X_F)\right)$			$r_n(X_F)$		
		IV			V			VI		
X_F	n									
	0	+ 0. 012	410	931	+ 0. 008	255	416	0. 156	763	851
	1	− 0. 011	379	004	− 0. 031	013	425	0. 075	097	184
	2	− 0. 008	785	283	+ 0. 018	630	301	0. 033	007	350
2.0	3	− 0. 001	533	986	+ 0. 007	306	911	0. 000	977	719
	4	− 0. 000	125	895	+ 0. 000	889	841	0. 000	047	046
	5	− 0. 000	006	095	+ 0. 000	056	374	0. 000	001	512
	6	− 0. 000	000	195	+ 0. 000	002	225	0. 000	000	038
	7	− 0. 000	000	004	+ 0. 000	000	060	0. 000	000	003
	8	0. 000	000	000	+ 0. 000	000	001	0. 000	000	001
	0	+ 0. 003	551	935	+ 0. 032	757	913	0. 110	702	286
	1	− 0. 000	931	302	− 0. 034	620	518	0. 085	049	556
	2	− 0. 007	824	652	+ 0. 005	184	534	0. 022	992	191
	3	− 0. 002	620	974	+ 0. 010	388	206	0. 003	026	167
	4	− 0. 000	368	104	+ 0. 002	392	806	0. 000	235	083
2.5	5	− 0. 000	029	356	+ 0. 000	258	467	0. 000	012	070
	6	− 0. 000	001	525	+ 0. 000	016	786	0. 000	000	444
	7	− 0. 000	000	056	+ 0. 000	000	736	0. 000	000	014
	8	− 0. 000	000	001	+ 0. 000	000	023	0. 000	000	002
	9	− 0. 000	000	000	+ 0. 000	000	000	0. 000	000	000

		IV $-\frac{1}{8X_F^2} J_{2n}(2X_F)$	V $\frac{1}{8X_F}(J_{2n-1}(2X_F)-J_{2n+1}(2X_F))$	VI $r_n(X_F)$
X_F	n			
	0	− 0. 002 092 295	+ 0. 023 056 988	0. 081 451 231
	1	+ 0. 003 373 239	− 0. 016 310 510	0. 083 281 327
	2	− 0. 004 967 244	− 0. 010 304 945	0. 034 799 791
3.0	3	− 0. 003 414 400	+ 0. 009 687 517	0. 006 981 167
	4	− 0. 000 785 166	+ 0. 004 517 555	0. 000 813 345
	5	− 0. 000 096 721	+ 0. 000 796 557	0. 000 061 952
	6	− 0. 000 007 571	+ 0. 000 079 803	0. 000 002 046
	7	− 0. 000 000 413	+ 0. 000 005 270	0. 000 000 135
	8	− 0. 000 000 016	+ 0. 000 000 248	0. 000 000 005
	9	+ 0. 000 000 000	+ 0. 000 000 008	0. 000 000 001
	10	+ 0. 000 000 000	+ 0. 000 000 000	0. 000 000 000
	0	− 0. 003 062 033	+ 0. 000 334 487	0. 066 852 651
	1	− 0. 003 075 685	+ 0. 005 816 884	0. 073 534 367
	2	− 0. 001 610 185	− 0. 018 408 996	0. 044 368 548
	3	− 0. 000 461 189	+ 0. 004 082 598	0. 012 934 153
3.5	4	− 0. 001 305 821	+ 0. 006 237 966	0. 002 153 424
	5	− 0. 000 240 197	+ 0. 001 806 633	0. 000 231 427
	6	− 0. 000 027 098	+ 0. 000 270 162	0. 000 017 409
	7	− 0. 000 002 093	+ 0. 000 025 701	0. 000 000 972
	8	− 0. 000 000 118	+ 0. 000 001 717	0. 000 000 043
	9	− 0. 000 000 005	+ 0. 000 000 085	0. 000 000 003
	10	− 0. 000 000 000	+ 0. 000 000 003	0. 000 000 001
	11		0. 000 000 000	0. 000 000 000

		IV	V	VI
		$-\dfrac{1}{8X_F^2}\,J_{2n}\,(2X_F)$	$\dfrac{1}{8X_F}\,(J_{2n-1}{}^{(2X_F)}- J_{2n+1}{}^{(2X_F)})$	$r_n\,(X_F)$
X_F	n			
	0	− 0. 001 341 021	− 0. 014 664 771	0. 060 848 254
	1	+ 0. 000 882 747	+ 0. 016 430 267	0. 061 482 859
	2	+ 0. 000 823 104	− 0. 014 903 343	0. 049 262 718
	3	− 0. 002 637 311	− 0. 004 212 947	0. 020 116 032
	4	− 0. 001 745 742	+ 0. 006 070 880	0. 004 628 859
4.0	5	− 0. 000 474 742	+ 0. 003 147 631	0. 000 677 853
	6	− 0. 000 075 186	+ 0. 000 697 558	0. 000 068 777
	7	− 0. 000 007 962	+ 0. 000 093 193	0. 000 005 131
	8	− 0. 000 000 609	+ 0. 000 008 536	0. 000 000 294
	9	− 0. 000 000 035	+ 0. 000 000 575	0. 000 000 014
	10	− 0. 000 000 001	+ 0. 000 000 029	0. 000 000 001
	11	0. 000 000 000	+ 0. 000 000 001	0. 000 000 001
			+ 0. 000 000 000	
	0	+ 0. 000 557 614	− 0. 013 628 432	0. 057 358 432
	1	− 0. 000 894 119	+ 0. 011 840 193	0. 051 692 400
	2	0. 001 638 708	− 0. 003 497 120	0. 049 000 212
	3	− 0. 001 261 213	− 0. 010 624 992	0. 027 033 674
	4	− 0. 001 883 130	+ 0. 003 127 230	0. 008 388 164
4.5	5	− 0. 000 769 716	+ 0. 004 240 643	0. 001 632 557
	6	− 0. 000 169 091	+ 0. 001 427 419	0. 000 217 629
	7	− 0. 000 024 041	+ 0. 000 265 108	0. 000 002 115
	8	− 0. 000 002 427	+ 0. 000 032 621	0. 000 001 569
	9	− 0. 000 000 184	+ 0. 000 002 903	0. 000 000 093
	10	− 0. 000 000 010	+ 0. 000 000 197	0. 000 000 006

		IV $-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$			V $\dfrac{1}{8X_F}(J_{2n-1}^{(2X_F)} - J_{2n+1}^{(2X_F)})$			VI $r_n(X_F)$		
X_F	n									
4.5	11	− 0.	000	000 000	+ 0.	000	000 010	0.	000	000 001
	12				+ 0.	000	000 000	0.	000	000 000
	0	+ 0.	001	229 678	− 0.	002	173 637	0.	052	940 111
	1	− 0.	001	273 151	− 0.	000	372 665	0.	045	887 375
	2	+ 0.	001	098 013	+ 0.	007	311 022	0.	045	099 584
	3	+ 0.	000	072 294	− 0.	011	269 311	0.	032	074 461
	4	− 0.	001	589 270	− 0.	001	878 619	0.	013	145 263
5.0	5	− 0.	001	037 430	+ 0.	004	218 478	0.	003	338 196
	6	− 0.	000	316 851	+ 0.	002	353 611	0.	000	573 388
	7	− 0.	000	059 785	+ 0.	000	611 602	0.	000	071 133
	8	− 0.	000	007 833	+ 0.	000	100 058	0.	000	006 686
	9	− 0.	000	000 762	+ 0.	000	011 562	0.	000	000 494
	10	− 0.	000	000 057	+ 0.	000	001 005	0.	000	000 030
	11	− 0.	000	000 003	+ 0.	000	000 068	0.	000	000 002
	12	0.	000	000 000	+ 0.	000	000 003	0.	000	000 000
	0	+ 0.	000	707 397	+ 0.	008	035 596	0.	047	231 244
	1	+ 0.	000	574 576	− 0.	009	184 848	0.	043	139 748
	2	+ 0.	000	062 146	+ 0.	010	582 588	0.	040	058 475
5.5	3	+ 0.	000	832 991	− 0.	005	833 224	0.	034	260 127
	4	− 0.	000	929 635	− 0.	006	601 806	0.	018	145 717
	5	− 0.	001	158 794	+ 0.	002	450 942	0.	005	926 710
	6	− 0.	000	502 478	+ 0.	003	107 258	0.	001	292 764
	7	− 0.	000	125 493	+ 0.	001	165 580	0.	000	201 547

		IV $-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$	V $\dfrac{1}{8X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$	VI $r_n(X_F)$
X_F	n			
	8	$-$ 0. 000 021 115	$+$ 0. 000 253 469	0. 000 023 623
	9	$-$ 0. 000 002 595	$+$ 0. 000 037 669	0. 000 002 162
	10	$-$ 0. 000 000 245	$+$ 0. 000 004 142	0. 000 000 159
5.5	11	$-$ 0. 000 000 018	$+$ 0. 000 000 353	0. 000 000 010
	12	$-$ 0. 000 000 001	$+$ 0. 000 000 024	0. 000 000 001
	13	0. 000 000 000	$+$ 0. 000 000 001	0. 000 000 001
	14		0. 000 000 000	0. 000 000 000
	0	$-$ 0. 000 165 587	$+$ 0. 009 310 296	0. 041 623 793
	1	$+$ 0. 000 294 897	$-$ 0. 008 720 500	0. 041 390 169
	2	$-$ 0. 000 633 676	$+$ 0. 005 595 997	0. 035 970 938
	3	$+$ 0. 000 846 266	$+$ 0. 002 016 309	0. 033 698 108
	4	$-$ 0. 000 156 581	$-$ 0. 008 346 556	0. 022 391 989
	5	$-$ 0. 001 043 319	$-$ 0. 000 833 991	0. 009 287 146
6.0	6	$-$ 0. 000 678 056	$+$ 0. 003 130 512	0. 002 544 066
	7	$-$ 0. 000 225 834	$+$ 0. 001 844 483	0. 000 492 554
	8	$-$ 0. 000 048 581	$+$ 0. 000 539 893	0. 000 071 074
	9	$-$ 0. 000 007 473	$+$ 0. 000 102 891	0. 000 007 956
	10	$-$ 0. 000 000 872	$+$ 0. 000 014 179	0. 000 000 713
	11	$-$ 0. 000 000 080	$+$ 0. 000 001 497	0. 000 000 052
	12	$-$ 0. 000 000 006	$+$ 0. 000 000 126	0. 000 000 004
	13	0. 000 000 000	$+$ 0. 000 000 008	0. 000 000 001
	14		$+$ 0. 000 000 000	0. 000 000 000

	IV	V	VI
	$-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$	$\dfrac{1}{8X_F}\left(J_{2n-1}^{(2X_F)} - J_{2n+1}^{(2X_F)}\right)$	$r_n(X_F)$

X_F	n	IV	V	VI
	0	− 0. 000 612 207	+ 0. 002 704 540	0. 037 470 534
	1	+ 0. 000 644 213	− 0. 001 416 112	0. 039 086 936
	2	− 0. 000 648 747	− 0. 002 467 302	0. 033 628 720
	3	+ 0. 000 349 203	+ 0. 007 157 509	0. 031 451 658
	4	+ 0. 000 417 295	− 0. 005 914 368	0. 025 051 425
	5	− 0. 000 691 662	− 0. 004 340 619	0. 013 007 284
	6	− 0. 000 773 777	+ 0. 001 971 914	0. 004 434 778
	7	− 0. 000 351 363	+ 0. 002 394 328	0. 001 056 606
	8	− 0. 000 096 818	+ 0. 000 975 659	0. 000 177 790
6.5	9	− 0. 000 018 548	+ 0. 000 239 573	0. 000 025 174
	10	− 0. 000 002 654	+ 0. 000 041 210	0. 000 002 713
	11	− 0. 000 000 296	+ 0. 000 005 342	0. 000 000 239
	12	− 0. 000 000 026	+ 0. 000 000 545	0. 000 000 018
	13	− 0. 000 000 002	+ 0. 000 000 045	0. 000 000 001
	14	− 0. 000 000 000	+ 0. 000 000 003	0. 000 000 001
	15		+ 0. 000 000 000	0. 000 000 000
	0	− 0. 000 436 411	− 0. 004 763 398	0. 035 028 603
	1	+ 0. 000 387 805	+ 0. 005 539 010	0. 035 957 429
	2	− 0. 000 194 501	− 0. 007 092 625	0. 032 539 019
7.0	3	− 0. 000 207 061	+ 0. 006 628 260	0. 028 916 343
	4	+ 0. 000 591 768	− 0. 000 651 745	0. 025 832 390
	5	− 0. 000 216 853	− 0. 006 250 938	0. 016 456 859

		IV	V	VI
		$-\dfrac{1}{8X_F^2}\, J_{2n}(2X_F)$	$\dfrac{1}{8X_F}\,(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$	$r_n(X_F)$
X_F	n			
	6	− 0. 000 728 189	− 0. 000 318 796	0. 006 925 464
	7	− 0. 000 473 258	+ 0. 002 431 449	0. 002 016 195
	8	− 0. 000 168 706	+ 0. 001 494 869	0. 000 428 961
	9	− 0. 000 040 225	+ 0. 000 480 366	0. 000 069 694
7.0	10	− 0. 000 007 022	+ 0. 000 103 256	0. 000 008 960
	11	− 0. 000 000 946	+ 0. 000 016 359	0. 000 000 936
	12	− 0. 000 000 102	+ 0. 000 002 016	0. 000 000 081
	13	− 0. 000 000 009	+ 0. 000 000 200	0. 000 000 006
	14	0. 000 000 000	+ 0. 000 000 016	0. 000 000 002
	15		+ 0. 000 000 001	0. 000 000 001
	16		+ 0. 000 000 000	0. 000 000 000
	0	+ 0. 000 031 609	− 0. 006 836 801	0. 033 545 414
	1	− 0. 000 092 381	+ 0. 006 652 038	0. 032 704 805
	2	+ 0. 000 264 842	− 0. 005 407 906	0. 031 661 080
	3	− 0. 000 458 110	+ 0. 001 599 874	0. 027 096 554
	4	+ 0. 000 386 630	+ 0. 004 241 831	0. 025 104 079
7.5	5	+ 0. 000 200 159	− 0. 005 333 278	0. 019 007 421
	6	− 0. 000 525 924	− 0. 002 979 406	0. 009 776 753
	7	− 0. 000 547 644	+ 0. 001 623 475	0. 003 457 664
	8	− 0. 000 258 161	+ 0. 001 912 958	0. 000 884 576
	9	− 0. 000 076 946	+ 0. 000 832 589	0. 000 171 387
	10	− 0. 000 016 356	+ 0. 000 225 328	0. 000 026 076

	IV	V	VI
	$-\dfrac{1}{8X_F^2}\,J_{2n}(2X_F)$	$\dfrac{1}{8X_F}\left(J_{2n-1}(2X_F)-J_{2n+1}(2X_F)\right)$	$r_n(X_F)$

X_F	n	IV	V	VI
	11	− 0. 000 002 645	+ 0. 000 043 597	0. 000 003 205
	12	− 0. 000 000 339	+ 0. 000 006 455	0. 000 000 326
	13	− 0. 000 000 035	+ 0. 000 000 762	0. 000 000 028
7.5	14	− 0. 000 000 003	0. 000 000 074	0. 000 000 003
	15	− 0. 000 000 000	0. 000 000 006	0. 000 000 001
	16		0. 000 000 000	0. 000 000 000
	0	+ 0. 000 341 599	− 0. 002 824 911	0. 032 053 108
	1	− 0. 000 363 669	+ 0. 002 097 572	0. 030 149 176
	2	+ 0. 000 395 784	+ 0. 000 212 902	0. 030 256 093
	3	− 0. 000 325 626	− 0. 003 749 798	0. 026 212 592
	4	+ 0. 000 013 713	+ 0. 005 813 262	0. 023 677 701
	5	+ 0. 000 402 745	− 0. 001 895 512	0. 020 293 180
8.0	6	− 0. 000 219 531	− 0. 004 766 322	0. 012 576 583
	7	− 0. 000 532 102	− 0. 000 048 727	0. 005 372 880
	8	− 0. 000 346 588	+ 0. 001 952 746	0. 001 645 180
	9	− 0. 000 130 562	+ 0. 001 242 537	0. 000 378 008
	10	− 0. 000 033 845	+ 0. 000 430 685	0. 000 067 699
	11	− 0. 000 006 550	+ 0. 000 102 118	0. 000 009 738
	12	− 0. 000 000 993	+ 0. 000 018 134	0. 000 001 153
	13	− 0. 000 000 122	+ 0. 000 002 537	0. 000 000 115
	14	− 0. 000 000 012	+ 0. 000 000 289	0. 000 000 010
	15	− 0. 000 000 001	+ 0. 000 000 027	0. 000 000 001
	16	0. 000 000 000	+ 0. 000 000 002	
	17		+ 0. 000 000 000	

		IV	V	VI
		$-\dfrac{1}{8X_F^2}\,J_{2n}(2X_F)$	$\dfrac{1}{8X_F}\left(J_{2n-1}(2X_F) - J_{2n+1}(2X_F)\right)$	$r_n(X_F)$

X_F	n			
	0	+ 0. 000 293 865	+ 0. 002 872 602	0. 030 099 110
	1	− 0. 000 273 985	− 0. 003 420 574	0. 028 552 166
	2	+ 0. 000 191 593	+ 0. 004 734 921	0. 028 295 097
	3	− 0. 000 001 237	− 0. 005 508 723	0. 025 822 988
	4	− 0. 000 265 980	+ 0. 003 388 303	0. 022 373 912
	5	+ 0. 000 344 486	+ 0. 002 184 409	0. 020 371 209
	6	+ 0. 000 084 039	− 0. 004 620 802	0. 014 861 358
8.5	7	− 0. 000 409 024	− 0. 002 114 008	0. 007 616 281
	8	− 0. 000 404 852	+ 0. 001 362 703	0. 002 780 475
	9	− 0. 000 196 904	+ 0. 001 570 651	0. 000 754 638
	10	− 0. 000 062 604	+ 0. 000 721 547	0. 000 158 365
	11	− 0. 000 014 499	+ 0. 000 211 576	0. 000 026 523
	12	− 0. 000 002 594	+ 0. 000 045 118	0. 000 003 636
	13	− 0. 000 000 372	+ 0. 000 007 459	0. 000 000 416
	14	− 0. 000 000 044	+ 0. 000 000 994	0. 000 000 041
	15	− 0. 000 000 004	+ 0. 000 000 109	0. 000 000 004
	16	− 0. 000 000 000	+ 0. 000 000 010	0. 000 000 001
	17		0. 000 000 000	0. 000 000 000

	IV	V	VI
	$-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$	$\dfrac{1}{8X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$	$r_n(X_F)$

X_F n	IV	V	VI
0	+ 0. 000 020 610	+ 0. 005 222 080	0. 027 904 243
1	+ 0. 000 011 624	– 0. 005 198 831	0. 027 542 889
2	– 0. 000 107 468	+ 0. 004 745 709	0. 026 272 837
3	+ 0. 000 240 673	– 0. 002 871 796	0. 025 302 414
4	– 0. 000 302 366	– 0. 000 991 173	0. 021 633 358
5	+ 0. 000 112 916	+ 0. 004 539 266	0. 019 680 491
6	+ 0. 000 271 977	– 0. 002 404 702	0. 016 289 958
7	– 0. 000 203 043	– 0. 003 701 627	0. 009 909 345
8	– 0. 000 402 904	+ 0. 000 097 764	0. 004 296 394
9.0 9	– 0. 000 263 317	+ 0. 001 608 984	0. 001 373 166
10	– 0. 000 103 867	+ 0. 001 053 390	0. 000 336 485
11	– 0. 000 028 867	+ 0. 000 388 868	0. 000 065 351
12	– 0. 000 006 089	+ 0. 000 100 075	0. 000 010 330
13	– 0. 000 001 019	+ 0. 000 019 554	0. 000 001 359
14	– 0. 000 000 139	+ 0. 000 003 043	0. 000 000 152
15	– 0. 000 000 016	+ 0. 000 000 389	0. 000 000 015
16	– 0. 000 000 001	+ 0. 000 000 041	0. 000 000 002
17	0. 000 000 000	+ 0. 000 000 003	0. 000 000 000
18		+ 0. 000 000 000	

		IV	V	VI
		$-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$	$\dfrac{1}{8X_F}\left(J_{2n-1}(2X_F) - J_{2n+1}(2X_F)\right)$	$r_n(X_F)$

X_F	n			
	0	− 0. 000 203 087	+ 0. 002 781 616	0. 025 983 416
	1	+ 0. 000 218 498	− 0. 002 344 619	0. 026 537 150
	2	− 0. 000 250 204	+ 0. 000 907 806	0. 024 703 376
	3	+ 0. 000 247 599	+ 0. 001 579 610	0. 024 313 262
	4	− 0. 000 128 727	− 0. 004 095 030	0. 021 391 547
	5	− 0. 000 126 805	+ 0. 003 856 799	0. 018 811 990
	6	+ 0. 000 284 568	+ 0. 000 826 070	0. 016 786 355
	7	+ 0. 000 020 869	− 0. 003 948 711	0. 011 908 921
	8	− 0. 000 324 736	− 0. 001 539 256	0. 006 101 312
	9	− 0. 000 309 588	+ 0. 001 162 447	0. 002 290 440
9.5	10	− 0. 000 154 637	+ 0. 001 317 399	0. 000 653 633
	11	− 0. 000 051 913	+ 0. 000 633 263	0. 000 146 740
	12	− 0. 000 012 923	+ 0. 000 198 665	0. 000 026 654
	13	− 0. 000 002 519	+ 0. 000 045 995	0. 000 004 007
	14	− 0. 000 000 398	+ 0. 000 008 349	0. 000 000 508
	15	− 0. 000 000 052	+ 0. 000 001 233	0. 000 000 056
	16	− 0. 000 000 005	+ 0. 000 000 152	0. 000 000 007
	17	− 0. 000 000 000	+ 0. 000 000 015	0. 000 000 001
	18		+ 0. 000 000 001	0. 000 000 000
	19		0. 000 000 000	

		IV				V				VI		
		$-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$				$\dfrac{1}{8X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$				$r_n(X_F)$		

X_F	n												
	0	−	0	000	208	780	− 0.	001	670	828	− 0.	024	646	010
	1	+	0.	000	200	426	+ 0.	002	071	681	0.	025	216	537
	2	−	0.	000	163	338	− 0.	003	125	889	0.	023	721	298
	3	+	0.	000	068	857	+ 0.	004	192	389	0.	022	971	506
	4	+	0.	000	092	336	− 0.	003	866	845	0.	021	260	770
	5	−	0.	000	233	103	+ 0.	000	797	124	0.	018	217	033
	6	+	0.	000	148	738	+ 0.	003	318	766	0.	016	568	938
	7	+	0.	000	182	997	− 0.	002	541	662	0.	013	323	112
	8	−	0.	000	181	474	− 0.	002	923	898	0.	008	001	335
	9	−	0.	000	313	862	+ 0.	000	177	973	0.	003	518	570
10.0	10	−	0.	000	205	934	+ 0.	001	352	853	0.	001	167	021
	11	−	0.	000	084	478	+ 0.	000	907	311	0.	000	302	128
	12	−	0.	000	024	911	+ 0.	000	353	344	0.	000	062	875
	13	−	0.	000	005	654	+ 0.	000	097	505	0.	000	010	773
	14	−	0.	000	001	030	+ 0.	000	020	672	0.	000	001	550
	15	−	0.	000	000	155	+ 0.	000	003	523	0.	000	000	190
	16	−	0.	000	000	019	+ 0.	000	000	497	0.	000	000	021
	17	−	0.	000	000	002	+ 0.	000	000	059	0.	000	000	002
	18		0.	000	000	000	+ 0.	000	000	006	0.	000	000	001
	19						+ 0.	000	000	000	0.	000	000	000

		IV	V	VI
		$-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$	$\dfrac{1}{8X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$	$r_n(X_F)$

X_F	n	IV	V	VI
	0	− 0. 000 041 472	− 0. 004 074 292	0. 023 780 906
	1	+ 0. 000 022 995	+ 0. 004 120 282	0. 023 694 337
	2	+ 0. 000 033 688	− 0. 004 031 519	0. 023 066 711
	3	− 0. 000 122 050	+ 0. 003 164 460	0. 021 661 321
	4	+ 0. 000 199 261	− 0. 000 838 068	0. 020 865 453
	5	− 0. 000 168 403	− 0. 002 440 068	0. 018 020 389
	6	− 0. 000 037 334	+ 0. 003 676 093	0. 016 039 996
	7	+ 0. 000 227 651	− 0. 000 040 955	0. 014 025 358
	8	− 0. 000 013 626	− 0. 003 364 198	0. 009 739 469
10.5	9	− 0. 000 262 553	− 0. 001 143 746	0. 004 998 405
	10	− 0. 000 243 226	+ 0. 001 005 183	0. 001 923 556
	11	− 0. 000 124 330	+ 0. 001 124 080	0. 000 573 266
	12	− 0. 000 043 730	+ 0. 000 561 665	0. 000 136 382
	13	− 0. 000 011 582	+ 0. 000 186 710	0. 000 026 562
	14	− 0. 000 002 430	+ 0. 000 046 392	0. 000 004 322
	15	− 0. 000 000 417	+ 0. 000 009 127	0. 000 000 598
	16	− 0. 000 000 060	+ 0. 000 001 473	0. 000 000. 072
	17	− 0. 000 000 007	+ 0. 000 000 199	0. 000 000 008
	18	− 0. 000 000 000	+ 0. 000 000 023	0. 000 000 002
	19		+ 0. 000 000 002	0. 000 000 000
	20		0. 000 000 000	

	IV	V	VI
	$-\dfrac{1}{8X_F^2} J_{2n}(2X_F)$	$\dfrac{1}{8X_F}\left(J_{2n-1}(2X_F) - J_{2n+1}(2X_F)\right)$	$r_n(X_F)$

X_F n			
0	+ 0. 000 124 639	− 0. 002 663 131	0. 023 023 101
1	− 0. 000 135 644	+ 0. 002 391 842	0. 022 313 724
2	+ 0. 000 161 932	− 0. 001 472 823	0. 022 355 907
3	− 0. 000 178 979	− 0. 000 248 785	0. 020 698 934
4	+ 0. 000 140 720	+ 0. 002 448 432	0. 020 097 372
5	− 0. 000 007 796	− 0. 003 652 161	0. 018 037 351
6	− 0. 000 161 754	+ 0. 001 789 064	0. 015 588 842
7	+ 0. 000 153 589	+ 0. 002 302 253	0. 014 106 829
8	+ 0. 000 122 392	− 0. 002 494 236	0. 011 073 580
9	− 0. 000 160 042	− 0. 002 344 801	0. 006 591 485
11.0 10	− 0. 000 250 229	+ 0. 000 220 979	0. 002 937 733
11	− 0. 000 164 876	+ 0. 001 156 311	0. 001 006 573
12	− 0. 000 069 968	+ 0. 000 791 739	0. 000 273 318
13	− 0. 000 021 715	+ 0. 000 322 894	0. 000 060 386
14	− 0. 000 005 252	+ 0. 000 094 646	0. 000 011 093
15	− 0. 000 001 029	+ 0. 000 021 536	0. 000 001 725
16	− 0. 000 000 167	+ 0. 000 003 972	0. 000 000 231
17	− 0. 000 000 023	+ 0. 000 000 611	0. 000 000 028
18	− 0. 000 000 002	+ 0. 000 000 080	0. 000 000 004
19	− 0. 000 000 000	+ 0. 000 000 009	0. 000 000 001
20		+ 0. 000 000 000	0. 000 000 000

	IV $-\frac{1}{8x_F^2} J_{2n}(2X_F)$	V $\frac{1}{8X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$	VI $r_n(X_F)$
X_F n			
0	+ 0. 000 153 509	+ 0. 000 859 115	0. 022 086 660
1	− 0. 000 150 261	− 0. 001 159 638	0. 021 313 575
2	+ 0. 000 133 699	+ 0. 001 994 959	0. 021 398 493
3	− 0. 000 085 878	− 0. 003 045 028	0. 020 113 897
4	− 0. 000 008 345	+ 0. 003 493 537	0. 019 139 890
5	+ 0. 000 124 946	− 0. 002 177 314	0. 017 963 895
6	− 0. 000 163 533	− 0. 001 034 551	0. 015 415 935
7	+ 0. 000 016 235	+ 0. 003 224 248	0. 013 831 909
8	+ 0. 000 179 504	− 0. 000 579 472	0. 011 864 318
9	− 0. 000 032 154	− 0. 002 811 370	0. 008 102 589
11.5 10	− 0. 000 215 682	− 0. 000 863 503	0. 004 170 710
11	− 0. 000 195 357	+ 0. 000 879 275	0. 001 641 199
12	− 0. 000 101 911	+ 0. 000 972 722	0. 000 508 069
13	− 0. 000 037 328	+ 0. 000 502 626	0. 000 127 144
14	− 0. 000 010 435	+ 0. 000 175 717	0. 000 026 315
15	− 0. 000 002 334	+ 0. 000 046 435	0. 000 004 590
16	− 0. 000 000 431	+ 0. 000 009 800	0. 000 000 685
17	− 0. 000 000 067	+ 0. 000 001 709	0. 000 000 089
18	− 0. 000 000 008	+ 0. 000 000 252	0. 000 000 012
19	− 0. 000 000 001	+ 0. 000 000 031	0. 000 000 001
20	0. 000 000 000	+ 0. 000 000 003	0. 000 000 000
21		0. 000 000 000	

		IV $-\frac{1}{8X_F^2} J_{2n}(2X_F)$	V $\frac{1}{8X_F}(J_{2n-1}(2X_F) - J_{2n+1}(2X_F))$	VI $r_n(X_F)$
X_F	n			
	0	+ 0. 000 048 811	+ 0. 003 209 126	0. 020 966 886
	1	− 0. 000 037 668	− 0. 003 284 462	0. 020 648 877
	2	+ 0. 000 002 670	+ 0. 003 370 480	0. 020 297 538
	3	+ 0. 000 056 030	− 0. 003 044 978	0. 019 683 493
	4	− 0. 000 121 869	+ 0. 001 733 842	0. 018 285 935
	5	+ 0. 000 145 584	+ 0. 000 696 956	0. 017 603 309
	6	− 0. 000 063 359	− 0. 002 913 114	0. 015 474 906
	7	− 0. 000 102 455	+ 0. 002 239 057	0. 013 512 472
	8	+ 0. 000 144 365	+ 0. 001 505 165	0. 012 130 816
	9	+ 0. 000 080 826	− 0. 002 360 146	0. 009 333 019
	10	− 0. 000 140 549	− 0. 001 905 709	0. 005 521 423
12	11	− 0. 000 203 376	+ 0. 000 242 413	0. 002 492 177
	12	− 0. 000 134 585	+ 0. 001 001 821	0. 000 878 919
	13	− 0. 000 058 837	+ 0. 000 698 401	0. 000 248 873
	14	− 0. 000 019 097	+ 0. 000 296 573	0. 000 057 948
	15	− 0. 000 004 883	+ 0. 000 091 652	0. 000 011 317
	16	− 0. 000 001 020	+ 0. 000 022 191	0. 000 001 885
	17	− 0. 000 000 178	+ 0. 000 004 387	0. 000 000 272
	18	− 0. 000 000 026	+ 0. 000 000 728	0. 000 000 035
	19	− 0. 000 000 003	+ 0. 000 000 103	0. 000 000 005
	20	− 0. 000 000 000	+ 0. 000 000 012	0. 000 000 001
	21		+ 0. 000 000 001	0. 000 000 000
	22		+ 0. 000 000 000	

	VII $1+(q_1)^2\frac{n^2}{x_F^2}$ q1=3	VIII Col. VI/Col. VII	IX $1+(q_1)^2\frac{n^2}{x_F^2}$ q1=7	X Col. VI/Col. IX
x_F n				
0 1		0. 317 106 269	1	0. 317 106 269
0.5 1 37		0. 000 217 319	197	0. 000 040 816
2 145		0. 000 000 499	785	0. 000 000 092
3 325		0. 000 000 001	1765	0. 000 000 000
4 577		0. 000 000 000		
0 1		0. 273 385 667	1	0. 273 385 667
1 10		0. 002 888 848	50	0. 000 577 769
1.0 2 37		0. 000 028 783	197	0. 000 005 406
3 82		0. 000 000 245	442	0. 000 000 045
4 145		0. 000 000 001	785	0. 000 000 000
5 226		0. 000 000 000	1226	
0 1		0. 214 894 401	1	0. 214 894 401
1 45/9		0. 010 864 463	205/9	0. 002 384 882
1.5 2 153/9		0. 000 275 717	793/9	0. 000 053 196
3 333/9		0. 000 005 526	1773/9	0. 000 001 037
4 585/9		0. 000 000 083	3145/9	0. 000 000 015
5 909/9		0. 000 000 001	4909/9	0. 000 000 000
6 1305/9		0. 000 000 000		
0 1.00		0. 156 763 851	1	0. 156 763 851
1 3.25		0. 023 106 825	53/4	0. 005 667 712
2.0 2 10.00		0. 003 300 735	50	0. 000 660 147
3 21.25		0. 000 046 010	445/4	0. 000 008 788

X_F	n	VII $1+(q1)^2\dfrac{n^2}{x_F^2}$	VIII Col. VI/Col. VII	IX $1+(q1)^2\dfrac{n^2}{x_F^2}$	X Col. VI/Col. IX
		$q1=3$		$q1=7$	
	4	37.00	0. 000 001 271	197	0. 000 000 238
2.0	5	57.25	0. 000 000 026	1229/4	0. 000 000 004
	6	82.00	0. 000 000 000	442	0. 000 000 000
	0	1	0. 110 702 286	1	0. 110 702 286
	1	61/25	0. 034 856 375	221/25	0. 009 620 990
	2	169/25	0. 003 401 211	809/25	0. 000 710 512
	3	349/25	0. 000 216 774	1789/25	0. 000 042 288
2.5	4	601/25	0. 000 009 778	3161/25	0. 000 001 859
	5	925/25	0. 000 000 326	4925/25	0. 000 000 061
	6	1321/25	0. 000 000 008	7081/25	0. 000 000 001
	7	1789/25	0. 000 000 000	9629/25	0. 000 000 000
	0	1.00	0. 081 451 231	1	0. 081 451 231
	1	2.00	0. 041 640 663	58/9	0. 012 922 964
	2	5.00	0. 006 959 958	205/9	0. 001 527 795
	3	10.00	0. 000 698 116	50	0. 000 139 623
3.0	4	17.00	0. 000 047 843	793/9	0. 000 009 230
	5	26.00	0. 000 002 382	1234/9	0. 000 000 451
	6	37.00	0. 000 000 055	197	0. 000 000 010
	7	50.00	0. 000 000 002	2410/9	0. 000 000 000
	8	65.00	0. 000 000 000	3145/9	

x_F	n	VII $1+(q1)^2\frac{n^2}{x_F^2}$ ql=3	VIII Col. VI/Col. VII	IX $1+(q1)^2\frac{n^2}{x_F^2}$ ql=7	X Col. VI/Col. IX
	0	1	0. 066 852 651	1	0. 066 852 651
	1	85/49	0. 042 390 399	245/49	0. 014 706 873
	2	193/49	0. 011 264 553	833/49	0. 002 609 914
	3	373/49	0. 001 699 124	1813/49	0. 000 349 571
	4	625/49	0. 000 168 828	3187/49	0. 000 033 129
3.5	5	949/49	0. 000 011 949	4949/49	0. 000 002 291
	6	1345/49	0. 000 000 634	7105/49	0. 000 000 120
	7	1813/49	0. 000 000 026	9653/49	0. 000 000 004
	8	2353/49	0. 000 000 000	12593/49	0. 000 000 000
	0	1. 00 00	0. 060 848 254	1	0. 060 848 254
	1	1. 56 25	0. 039 349 029	65/16	0. 015 134 242
	2	3. 25 00	0. 015 157 759	53/4	0. 003 717 940
	3	6. 06 25	0. 003 318 108	457/16	0. 000 704 281
4.0	4	10. 00 00	0. 000 462 885	50	0. 000 092 577
	5	15. 06 25	0. 000 045 002	1241/16	0. 000 008 739
	6	21. 25 00	0. 000 003 236	445/4	0. 000 000 618
	7	28. 56 25	0. 000 000 179	2417/16	0. 000 000 033
	8	37. 00 00	0. 000 000 007	197	0. 000 000 001
	9	46. 56 25	0. 000 000 000	3985/16	0. 000 000 000

		VII $1+(q1)^2 \frac{n^2}{x_F^2}$ $q1=3$	VIII Col. VI/Col. VII	IX $1+(q1)^2 \frac{n^2}{x_F^2}$ $q1=7$	X Co. VI/Col. IX
x_F	n				
	0	1	0. 057 358 432	1	0. 057 358 432
	1	117/81	0. 035 787 046	277/81	0. 015 115 828
	2	225/81	0. 017 640 076	865/81	0. 004 588 459
	3	405/81	0. 005 406 734	1845/81	0. 001 186 844
4.5	4	657/81	0. 001 034 157	3217/81	0. 000 211 203
	5	981/81	0. 000 134 798	4981/81	0. 000 026 548
	6	1377/81	0. 000 012 801	7137/81	0. 000 002 469
	7	1845/81	0. 000 000 092	9685/81	0. 000 000 017
	8	2385/81	0. 000 000 053	12625/81	0. 000 000 010
	9	2997/81	0. 000 000 002	15957/81	0. 000 000 000
	10	3681/81	0. 000 000 000		
	0	1. 00	0. 052 940 111	1	0. 052 940 111
	1	1. 36	0. 033 740 716	2.96	0. 015 502 491
	2	2. 44	0. 018 483 436	8.84	0. 005 101 762
	3	4. 24	0. 007 564 731	18.64	0. 001 720 732
5.0	4	6. 76	0. 001 944 565	32.36	0. 000 406 219
	5	10. 00	0. 000 333 819	50	0. 000 066 763
	6	13. 96	0. 000 041 073	71.56	0. 000 008 012
	7	18. 64	0. 000 003 816	97.04	0. 000 000 733
	8	24. 04	0. 000 000 278	126.44	0. 000 000 052
	9	30. 16	0. 000 000 016	159.76	0. 000 000 003
	10	37. 00	0. 000 000 000	197.00	0. 000 000 000

		VII	VIII	IX	X
		$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
		ql=3		ql=7	
X_F	n				
	0	1	0. 047 231 244	1	0. 047 231 244
	1	157/121	0. 033 247 831	317/121	0. 016 466 591
	2	265/121	0. 018 290 850	905/121	0. 005 355 884
	3	445/121	0. 009 315 674	1885/121	0. 002 199 191.
5.5	4	697/121	0. 003 150 117	3257/121	0. 000 674 127
	5	1021/121	0. 000 702 381	5021/121	0. 000 142 826
	6	1417/121	0. 000 110 391	7177/121	0. 000 021 795
	7	1885/121	0. 000 012 937	9725/121	0. 000 002 507
	8	2425/121	0. 000 001 178	12665/121	0. 000 000 225
	9	3037/121	0. 000 000 086	15997/121	0. 000 000 016
	10	3721/121	0. 000 000 005	19721/121	0. 000 000 000
	11	4477/121	0. 000 000 000	23837/121	
	0	1. 00	0. 041 623 793	1	0. 041 623 793
	1	1. 25	0. 033 112 135	2.361111...	0. 017 529 953
	2	2. 00	0. 017 985 469	6.4444...	0. 005 581 697
	3	3. 25	0. 010 368 648	13.24999...	0. 002 543 253
6.0	4	5. 00	0. 004 478 397	22.777...	0. 000 983 062
	5	7. 25	0. 001 280 985	35.0277...	0. 000 265 136
	6	10. 00	0. 000 254 406	50	0. 000 050 881
	7	13. 25	0. 000 037 173	67.69444...	0. 000 007 276
	8	17. 00	0. 000 004 180	88.11111...	0. 000 000 806

		VII			VII			IX		X		
		$1+(q1)^2\dfrac{n^2}{x_F^2}$			Col. VI/Col. VII			$1+(q1)^2\dfrac{n^2}{x_F^2}$		Col. VI/Col. IX		
		q1=3						q1=7				
x_F	n											
	9	21. 25	0.	000 000	374		111.2499...		0.	000 000	071	
	10	26. 00	0.	000 000	029		137.11111...		0.	000 000	005	
6.0	11	31. 25	0.	000 000	001		165.6944...		0.	000 000	000	
	12	37. 00	0.	000 000	000		197					
	0	1	0.	037 470	534		1		0.	037 470	534	
	1	205/169	0.	032 222	888		365/169		0.	018 097	786	
	2	313/169	0.	018 157	360		953/169		0.	005 963	540	
	3	493/169	0.	010 781	602		1933/169		0.	002 749	782	
6.5	4	745/169	0.	005 682	806		3305/169		0.	001 280	996	
	5	1069/169	0.	002 056	343		5069/169		0.	000 433	661	
	6	1465/169	0.	000 511	588		7225/169		0.	000 103	733	
	7	1933/169	0.	000 092	377		9773/169		0.	000 018	271	
	8	2473/169	0.	000 012	149		12713/169		0.	000 002	363	
	9	3085/169	0.	000 001	379		16045/169		0.	000 000	265	
	10	3769/169	0.	000 000	121		19769/169		0.	000 000	023	
	11	4525/169	0.	000 000	008		23885/169		0.	000 000	001	
	12	5353/169	0.	000 000	000		28393/169		0.	000 000	000	
	0	1	0.	035 028	603		1		0.	035 028	603	
7.0	1	58/49	0.	030 377	827		2		0.	017 978	714	
	2	85/49	0.	018 757	787		5		0.	006 507	803	
	3	130/49	0.	010 899	236		10		0.	002 891	634	

	VII	VIII	IX	X
	$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
	$q1=3$		$q1=7$	

x_F	n				
	4	193/49	0. 006 558 482	17	0. 001 519 552
	5	274/49	0. 002 943 014	26	0. 000 632 956
	6	373/49	0. 000 909 779	37	0. 000 187 174
7.0	7	10	0. 000 201 619	50	0. 000 040 323
	8	625/49	0. 000 033 630	65	0. 000 006 599
	9	778/49	0. 000 004 389	82	0. 000 000 849
	10	949/49	0. 000 000 462	101	0. 000 000 088
	11	1138/49	0. 000 000 040	122	0. 000 000 007
	12	1345/49	0. 000 000 002	145	0. 000 000 000
	0	1	0. 033 545 414	1	0. 033 545 414
	1	261/225	0. 028 193 797	421/225	0. 017 478 815
	2	369/225	0. 019 305 536	1009/225	0. 007 060 201
	3	549/225	0. 011 105 145	1988/225	0. 003 065 221
	4	801/225	0. 007 052 707	3361/225	0. 001 680 576
7.5	5	1125/225	0. 003 801 484	5125/225	0. 000 834 472
	6	1521/225	0. 001 446 265	7281/225	0. 000 302 124
	7	1989/225	0. 000 391 138	9829/225	0. 000 079 150
	8	2529/225	0. 000 078 698	12769/225	0. 000 015 586
	9	3141/225	0. 000 012 277	16101/225	0. 000 002 395
	10	3825/225	0. 000 001 533	19825/225	0. 000 000 295

		VII	VIII	IX	X
		$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
		$q1=3$		$q1=7$	
x_F	n				
	11	4581/225	0. 000 000 157	23941/225	0. 000 000 030
7.5	12	5409/225	0. 000 000 013	28449/225	0. 000 000 002
	13	6309/225	0. 000 000 000	33349/225	0. 000 000 000
	0	1.000000	0. 032 053 108	1	0. 032 053 108
	1	1.140625	0. 026 432 154	113/64	0. 017 075 639
	2	1.562500	0. 019 363 899	65/16	0. 007 447 653
	3	2.265625	0. 011 569 695	505/64	0. 003 321 991
	4	3.250000	0. 007 285 446	53/4	0. 001 786 996
	5	4.515625	0. 004 493 991	1289/64	0. 001 007 574
8.0	6	6.062500	0. 002 074 487	457/16	0. 000 440 318
	7	8.656250	0. 000 620 693	2465/64	0. 000 139 498
	8	10.000000	0. 000 164 518	50	0. 000 032 903
	9	12.390625	0. 000 030 507	4033/64	0. 000 005 998
	10	15.062500	0. 000 004 494	1241/16	0. 000 000 872
	11	18.015625	0. 000 000 540	5993/64	0. 000 000 103
	12	21.250000	0. 000 000 054	445/4	0. 000 000 010
	13	24.765625	0. 000 000 004	8345/64	0. 000 000 000
	0	1	0. 030 099 110	1	0. 030 099 110
8.5	1	325/289	0. 025 389 464	485/289	0. 017 013 558
	2	433/289	0. 018 885 180	1073/289	0. 007 620 953
	3	613/289	0. 012 174 296	2053/289	0. 003 635 091

		VII	VIII	IX	X
		$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
		q1=3		q1=7	
x_F	n				
	4	865/289	0. 007 475 214	3425/289	0. 001 887 900
	5	1189/289	0. 004 951 454	5189/289	0. 001 134 569
	6	1585/289	0. 002 709 736	7345/289	0. 000 584 742
	7	2053/289	0. 001 072 140	9893/289	0. 000 222 491
	8	2593/289	0. 000 309 894	12833/289	0. 000 062 616
8.5	9	3205/289	0. 000 068 046	16165/289	0. 000 013 491
	10	3839/289	0. 000 011 768	19889/289	0. 000 002 301
	11	4645/289	0. 000 001 650	24005/289	0. 000 000 319
	12	5473/289	0. 000 000 191	28513/289	0. 000 000 036
	13	6373/289	0. 000 000 018	33413/289	0. 000 000 003
	14	7345/289	0. 000 000 001	38705/289	0. 000 000 000
	15	8389/289	0. 000 000 000		
	0	1.000000	0. 027 904 243	1	0. 027 904 243
	1	1.111111	0. 024 788 600	130/81	0. 017 161 338
	2.	1.444444	0. 018 188 887	277/81	0. 007 682 670
	3	2.000000	0. 012 651 207	9/58	0. 003 926 236
	4	2.777771	0. 007 788 008	865/81	0. 002 025 782
9.0	5	3.777777	0. 005 209 541	1306/81	0. 001 220 612
	6	5.000000	0. 003 257 991	9/205	0. 000 715 168
	7	6.444444	0. 001 537 656	2482/81	0. 000 323 391
	8	8.111111	0. 000 529 692	3217/81	0. 000 108 177

	VII	VIII	IX	X
	$1+(q_1)^2\,\dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q_1)^2\,\dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
	$q_1=3$		$q_1=7$	

X_F	n	VII	VIII	IX	X
	9	10.00000	0. 000 137 316	50	0. 000 027 463
	10	12.11111	0. 000 027 783	4981/81	0. 000 005 471
	11	14.444444	0. 000 004 524	6010/81	0. 000 000 880
9.0	12	17.000000	0. 000 000 607	9/793	0. 000 000 117
	13	19.77777	0. 000 000 068	8362/81	0. 000 000 013
	14	22.77777	0. 000 000 006	9685/81	0. 000 000 001
	0	1	0. 025 983 416	1	0. 025 983 416
	1	397/361	0. 024 130 758	557/361	0. 017 199 122
	2	505/361	0. 017 659 245	1145/361	0. 007 788 575
	3	685/361	0. 012 813 266	2125/361	0. 004 130 394
	4	937/361	0. 008 241 567	3497/361	0. 002 208 278
	5	1261/361	0. 005 385 510	5261/361	0. 001 290 843
	6	1657/361	0. 003 657 135	7417/361	0. 000 817 024
9.5	7	2125/361	0. 002 023 115	9965/361	0. 000 431 422
	8	2665/361	0. 000 826 481	12905/361	0. 000 170 675
	9	3277/361	0. 000 252 318	16237/361	0. 000 050 923
	10	3961/361	0. 000 059 571	19961/361	0. 000 011 821
	11	4717/361	0. 000 011 230	24077/361	0. 000 002 200
	12	5545/361	0. 000 001 735	28585/361	0. 000 000 336
	13	6445/361	0. 000 000 224	33485/361	0. 000 000 043

		VII	VIII	IX	X
		$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
		ql=3		ql=7	
X_F	n				
9.5	14	7417/361	0. 000 000 024	38777/361	0. 000 000 004
	15	8461/361	0. 000 000 002	44461/361	0. 000 000 000
	16	9577/361	0. 000 000 000	50537/361	
	0	1.00	0. 024 646 010	1.00	0. 024 646 010
	1	1.09	0. 023 134 437	1.49	0. 016 923 850
	2	1.36	0. 017 442 130	2.96	0. 008 013 952
	3	1.81	0. 012 691 439	5.41	0. 004 246 119
	4	2.44	0. 008 713 430	8.84	0. 002 405 064
	5	3.25	0. 005 605 240	13.25	0. 001 374 870
	6	4.24	0. 003 907 768	18.64	0. 000 888 891
	7	5.41	0. 002 462 682	25.01	0. 000 532 711
10.0	8	6.76	0. 001 183 629	32.36	0. 000 247 260
	9	8.29	0. 000 424 435	40.69	0. 000 086 472
	10	10.00	0. 000 116 702	50.00	0. 000 023 340
	11	11.89	0. 000 025 410	60.29	0. 000 005 011
	12	13.96	0. 000 004 503	71.56	0. 000 000 878
	13	16.21	0. 000 000 664	83.81	0. 000 000 128
	14	18.64	0. 000 000 083	97.04	0. 000 000 015
	15	21.25	0. 000 000 008	111.25	0. 000 000 001
	16	24.04	0. 000 000 000	126.44	0. 000 000 000

VII	VIII	IX	X
$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
$q1=3$		$q1=7$	

X_F	n	VII	VIII	IX	X
	0	1	0. 023 780 906	1	0. 023 780 906
	1	477/441	0. 021 906 085	637/441	0. 016 403 771
	2	585/441	0. 017 388 751	1225/441	0. 008 304 015
	3	765/441	0. 012 487 114	2205/441	0. 004 332 264
	4	1017/441	0. 009 047 851	3577/441	0. 002 572 453
	5	1341/441	0. 005 926 168	5341/441	0. 001 487 922
	6	1737/441	0. 004 072 330	7497/441	0. 000 943 529
	7	2205/441	0. 002 805 071	10045/441	0. 000 615 747
	8	2745/441	0. 001 564 701	12985/441	0. 000 330 774
10.5	9	3357/441	0. 000 656 626	16317/441	0. 000 135 092
	10	4041/441	0. 000 209 920	20041/441	0. 000 042 327
	11	4797/441	0. 000 052 701	24157/441	0. 000 010 465
	12	5625/441	0. 000 010 692	28665/441	0. 000 002 098
	13	6525/441	0. 000 001 795	33505/441	0. 000 000 348
	14	7497/441	0. 000 000 254	38857/441	0. 000 000 049
	15	8541/441	0. 000 000 030	44541/441	0. 000 000 005
	16	9657/441	0. 000 000 003	50617/441	0. 000 000 000
	17		0. 000 000 000		

		VII	VIII	IX	X
		$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
		$q1=3$		$q1=7$	
x_F	n				
	0	1	0. 023 023 101	1	0. 023 023 101
	1	130/121	0. 020 768 927	170/121	0. 015 882 121
	2	157/121	0. 017 229 711	317/121	0. 008 533 327
	3	202/121	0. 012 398 866	562/121	0. 004 456 532
	4	265/121	0. 009 176 535	611/121	0. 002 687 051
	5	346/121	0. 006 307 859	1346/121	0. 001 621 485
	6	445/121	0. 004 238 763	1885/121	0. 001 000 663
	7	562/121	0. 003 037 235	2522/121	0. 000 676 814
	8	697/121	0. 001 922 386	3257/121	0. 000 411 391
11.0	9	850/121	0. 000 938 317	4090/121	0. 000 195 004
	10	1021/121	0. 000 348 154	5021/121	0. 000 070 795
	11	10	0. 000 100 657	50	0. 000 020 131
	12	1417/121	0. 000 023 339	7177/121	0. 000 004 607
	13	1642/121	0. 000 004 449	8402/121	0. 000 000 869
	14	1885/121	0. 000 000 712	9725/121	0. 000 000 138
	15	2146/121	0. 000 000 097	11146/121	0. 000 000 018
	16	2425/121	0. 000 000 022	12665/121	0. 000 000 002
	17	2722/121	0. 000 000 002	14282/121	0. 000 000 000
	18	3037/121	0. 000 000 000		

		VII	VIII	IX	X
		$1+(q_1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q_1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. IX
		$q_1=3$		$q_1=7$	
x_F	n				
	0	1	0. 022 086 660	1	0. 022 086 660
	1	565/529	0. 019 955 541	725/529	0. 015 551 560
	2	673/529	0. 016 819 915	1313/529	0. 008 621 327
	3	853/529	0. 012 473 917	2293/529	0. 004 644 933
	4	1105/529	0. 009 162 897	3665/529	0. 002 762 619
	5	1429/529	0. 006 650 035	5429/529	0. 001 750 396
	6	1825/529	0. 004 468 509	7585/529	0. 001 075 152
	7	2293/529	0. 003 191 050	10133/529	0. 000 722 104
	8	2833/529	0. 002 215 398	13073/529	0. 000 480 090
11.5	9	3455/529	0. 001 244 200	16405/529	0. 000 261 278
	10	4129/529	0. 000 534 343	20129/529	0. 000 109 608
	11	4885/529	0. 000 177 726	24245/529	0. 000 035 809
	12	5713/529	0. 000 047 045	28753/529	0. 000 009 347
	13	6613/529	0. 000 010 170	33653/529	0. 000 001 998
	14	7585/529	0. 000 001 835	38945/529	0. 000 000 357
	15	8629/529	0. 000 000 281	44629/529	0. 000 000 054
	16	9745/529	0. 000 000 037	50705/529	0. 000 000 0007
	17	10933/529	0. 000 000 004	57173/529	0. 000 000 000
	18	12193/529	0. 000 000 000	64033/529	

		VII	VIII	IX	X
		$1+(q1)^2\frac{n^2}{x_F^2}$	Col. VI/Col. VII	$1+(q1)^2\frac{n^2}{x_F^2}$	Col. VI/Col. IX
		q1=3		q1=7	
X_F	n				
	0	1	0. 020 966 886	1	0. 020 966 886
	1	1.0625	0. 019 434 237	193/144	0. 015 406 416
	2	1.25	0. 016 238 030	340/144	0. 008 596 604
	3	1.5625	0. 012 597 435	585/144	0. 004 845 167
	4	2.0	0. 009 142 967	928/144	0. 002 837 472
	5	2.5625	0. 006 869 584	1369/144	0. 001 851 626
	6	3.25	0. 004 761 509	1908/144	0. 001 167 917
	7	4.0625	0. 003 326 146	2545/144	0. 000 764 556
	8	5.0	0. 002 426 163	3280/144	0. 000 532 572
12.0	9	6.0625	0. 001 539 467	4113/144	0. 000 326 757
	10	7.25	0. 000 761 575	5044/144	0. 000 157 629
	11	8.5625	0. 000 291 057	6073/144	0. 000 059 093
	12	10.	0. 000 087 891	50	0. 000 017 578
	13	11.5625	0. 000 021 524	8425/144	0. 000 004 253
	14	13.25	0. 000 004 373	9748/144	0. 000 000 856
	15	15.0625	0. 000 000 751	11169/144	0. 000 000 145
	16	17.0	0. 000 000 110	12688/144	0. 000 000 021
	17	19.0625	0. 000 000 014	14305/144	0. 000 000 002
	18	21.25	0. 000 000 001	16020/144	0. 000 000 000
	19	23.5625	0. 000 000 000	17833/144	

		XI	XII	XIII	XIV
		$1+(q_1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q_1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
		$q_1=11$		$q_1=15$	
x_F	n				
	0	1	0. 317 106 269	1	0. 317 106 269
	1	485	0. 000 016 579	901	0. 000 008 924
0.5	2	1937	0. 000 000 037	3601	0. 000 000 020
	3	4357	0. 000 000 000	8101	0. 000 000 000
	0	1	0. 273 385 667	1	0. 273 385 667
	1	122	0. 000 236 790	226	0. 000 127 825
	2	485	0. 000 002 195	901	0. 000 001 182
1.0	3	1090	0. 000 000 018	2026	0. 000 000 009
	4	1937	0. 000 000 000	3601	0. 000 000 000
	0	1	0. 214 894 401	1	0. 214 894 401
	1	493/9	0. 000 991 685	909/9	0. 000 537 844
	2	1945/9	0. 000 021 688	3609/9	0. 000 011 688
1.5	3	4365/9	0. 000 000 421	8109/9	0. 000 000 226
	4	7753/9	0. 000 000 006	14405/9	0. 000 000 003
	5	12109/9	0. 000 000 000	22509/9	0. 000 000 000
	0	1	0. 156 763 851	1	0. 156 763 851
	1	125/4	0. 002 403 109	229/4	0. 001 311 741
2.0	2	122	0. 000 270 552	226	0. 000 146 050
	3	1093	0. 000 003 578	2029/4	0. 000 001 927

		XI	XII	XIII	XIV
		$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
		$q1=11$		$q1-15$	
x_F	n				
	4	485	0. 000 000 097	901	0. 000 000 052
2.0	5	3029/4	0. 000 000 001	5629/4	0. 000 000 000
	6	1090	0. 000 000 000	2026	
	0	1	0. 110 702 286	1	0. 110 702 286
	1	509/25	0. 004 177 286	925/25	0. 002 298 636
	2	1961/25	0. 000 293 118	3625/25	0. 000 158 566
2.5	3	4381/25	0. 000 017 268	8125/25	0. 000 009 311
	4	7769/25	0. 000 000 756	14425/25	0. 000 000 407
	5	12125/25	0. 000 000 024	22525/25	0. 000 000 013
	6	17449/25	0. 000 000 000	32425/25	0. 000 000 000
	0	1	0. 081 451 231	1	0. 081 451 231
	1	130/9	0. 005 765 630	26	0. 003 203 127
	2	493/9	0. 000 635 290	101	0. 000 344 552
3.0	3	122	0. 000 057 222	226	0. 000 030 890
	4	1945/9	0. 000 003 763	401	0. 000 002 028
	5	3034/9	0. 000 000 183	626	0. 000 000 098
	6	485	0. 000 000 004	901	0. 000 000 002
	7	5938/9	0. 000 000 000	1226	0. 000 000 000

		XI $1+(q_1)^2\frac{n^2}{x_F^2}$ $q_1=11$	XII Col. VI/Col. XI	XIII $1+(q_1)^2\frac{n^2}{x_F^2}$ $q_1=15$	XIV Col. VI/Col. XIII
x_F	n				
	0	1	0. 066 852 651	1	0. 066 852 651
	1	533/49	0. 006 760 195	949/49	0. 003 796 821
	2	1985/49	0. 001 095 243	3649/49	0. 000 595 795
	3	4405/49	0. 000 143 875	8149/49	0. 000 077 773
3.5	4	7793/49	0. 000 013 540	14449/49	0. 000 007 302
	5	12149/49	0. 000 000 933	22549/49	0. 000 000 502
	6	17473/49	0. 000 000 048	32749/49	0. 000 000 026
	7	23765/49	0. 000 000 002	44149/49	0. 000 000 001
	8	31025/49	0. 000 000 000	57649/49	0. 000 000 000
	0	1	0. 060 848 254	1	0. 060 848 254
	1	137/16	0. 007 180 479	241/16	0. 004 081 849
	2	125/4	0. 001 576 406	229/4	0. 000 860 484
	3	1105/16	0. 000 291 272	2041/16	0. 000 157 695
4.0	4	122	0. 000 037 941	226	0. 000 020 481
	5	3041/16	0. 000 003 566	5641/16	0. 000 001 922
	6	1093/4	0. 000 000 251	2029/4	0. 000 000 135
	7	5945/16	0. 000 000 013	11041/16	0. 000 000 007
	8	485	0. 000 000 000	901	0. 000 000 000

		XI $1+(q_1)^2 \dfrac{n^2}{x_F^2}$ $q_1=11$	XII Col. VI/Col. XI	XIII $1+(q_1)^2 \dfrac{n^2}{x_F^2}$ $q_1=15$	XIV Col. VI/Col. XIII
X_F	n				
	0	1	0. 057 358 432	1	0. 057 358 432
	1	565/81	0. 007 410 768	981/81	0. 004 268 179
	2	2017/81	0. 001 967 782	3681/81	0. 001 078 244
	3	4437/81	0. 000 493 515	8181/81	0. 000 267 660
	4	7825/81	0. 000 086 829	14481/81	0. 000 046 919
4.5	5	12181/81	0. 000 010 856	22581/81	0. 000 005 856
	6	17505/81	0. 000 001 007	32481/81	0. 000 000 542
	7	23797/81	0. 000 000 007	44181/81	0. 000 000 003
	8	31057/81	0. 000 000 004	57681/81	0. 000 000 002
	9	39285/81	0. 000 000 000	72981/81	0. 000 000 000
	0	1	0. 052 940 111	1	0. 052 940 111
	1	5.84	0. 007 857 427	10	0. 004 588 737
	2	20.36	0. 002 215 107	37	0. 001 218 907
	3	44.56	0. 000 719 803	80	0. 000 391 151
	4	78.44	0. 000 167 583	145	0. 000 090 656
	5	122	0. 000 027 362	226	0. 000 014 770
5.0	6	175.24	0. 000 003 272	325	0. 000 001 764
	7	238.16	0. 000 000 298	442	0. 000 000 160
	8	310.76	0. 000 000 021	577	0. 000 000 011
	9	393.04	0. 000 000 001	730	0. 000 000 000

		XI	XII	XIII	XIV
		$1+(q_1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q_1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
		$q_1=11$		$q_1=15$	
X_F	n				
	0	1	0. 047 231 244	1	0. 047 231 244
	1	605/121	0. 008 627 949	1021/121	0. 005 112 546
	2	2057/121	0. 002 356 380	3721/121	0. 001 302 627
	3	4477/121	0. 000 925 949	8221/121	0. 000 504 254
	4	7865/121	0. 000 279 164	14521/121	0. 000 151 203
5.5	5	12221/121	0. 000 058 680	22621/121	0. 000 031 702
	6	17545/121	0. 000 008 915	32521/121	0. 000 004 809
	7	23837/121	0. 000 001 023	44221/121	0. 000 000 551
	8	30097/121	0. 000 000 094	57721/121	0. 000 000 049
	9	39325/121	0. 000 000 006	72021/121	0. 000 000 003
	10	48521/121	0. 000 000 000	90121/121	0. 000 000 000
	0	1	0. 041 623 793	1	0. 041 623 793
	1	4.36111	0. 009 490 739	7.25	0. 005 708 988
	2	14.444	0. 002 490 295	26.00	0. 001 383 497
	3	31.2499	0. 001 078 339	57.25	0. 000 588 613
	4	54.777	0. 000 408 778	101	0. 000 221 702
	5	85.0277	0. 000 109 224	157.25	0. 000 059 059
6.0	6	122	0. 000 020 853	226	0. 000 011 256
	7	165.694	0. 000 002 972	307.25	0. 000 001 603
	8	216.111	0. 000 000 328	401	0. 000 000 177

	XI	XII	XIII	XIV
	$1+(q_1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q_1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
	$q_1=11$		$q_1=15$	

x_F	n				
	9	273.2499	0. 000 000 029	507.25	0. 000 000 015
	10	337.111	0. 000 000 002	626.00	0. 000 000 001
6.0	11	407.6944	0. 000 000 000	757.25	0. 000 000 000
	0	1	0. 037 470 534	1	0. 037 470 534
	1	653/169	0. 010 115 914	1069/169	0. 006 179 319
	2	2105/169	0. 002 099 882	3769/169	0. 001 507 894
	3	4525/169	0. 001 174 658	8269/169	0. 000 642 802
	4	7913/169	0. 000 535 029	14569/169	0. 000 290 595
	5	12269/169	0. 000 179 169	22669/169	0. 000 096 970
6.5	6	17593/169	0. 000 042 600	32569/169	0. 000 023 011
	7	23885/169	0. 000 007 476	44269/169	0. 000 004 033
	8	31145/169	0. 000 000 964	57769/169	0. 000 000 520
	9	39373/169	0. 000 000 108	73069/169	0. 000 000 058
	10	48569/169	0. 000 000 009	90169/169	0. 000 000 005
	11	58733/169	0. 000 000 000	109069/169	0. 000 000 000
	0	1	0. 035 028 603	1	0. 035 028 603
	1	170/49	0. 010 364 200	274/49	0. 006 430 343
7.0	2	533/49	0. 002 991 391	949/49	0. 001 680 096
	3	1138/49	0. 001 245 079	2074/49	0. 000 683 173

	XI	XII	XIII	XIV
	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
	q1=11		q1=15	

X_F	n				
	4	1985/49	0. 000 637 676	3649/49	0. 000 346 886
	5	3074/49	0. 000 262 324	5674/49	0. 000 142 119
	6	4405/49	0. 000 077 036	8149/49	0. 000 041 642
	7	122	0. 000 016 526	226	0. 000 009 334
7.0	8	7793/49	0. 000 002 697	14449/49	0. 000 001 454
	9	9850/49	0. 000 000 346	18274/49	0. 000 000 186
	10	12149/49	0. 000 000 036	22549/49	0. 000 000 019
	11	14690/49	0. 000 000 003	27274/49	0. 000 000 001
	12	17473/49	0. 000 000 000	32449/49	0. 000 000 000
	0	1	0. 033 545 414	1	0. 033 545 414
	1	709/225	0. 010 378 816	1125/225	0. 006 540 961
	2	2161/225	0. 003 296 503	3825/225	0. 001 862 416
	3	4581/225	0. 001 330 872	8325/225	0. 000 732 339
	4	7969/225	0. 000 708 798	14625/225	0. 000 386 216
	5	12325/225	0. 000 346 991	22725/225	0. 000 188 192
7.5	6	17649/225	0. 000 124 639	32625/225	0. 000 067 425
	7	23941/225	0. 000 032 495	44325/225	0. 000 017 551
	8	31201/225	0. 000 006 378	57825/225	0. 000 003 441
	9	39429/225	0. 000 000 978	73125/225	0. 000 000 527

	XI	XII	XIII	XIV
	$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
	ql=11		ql=15	
X_F n				
10	48625/225	0. 000 000 120	90225/225	0. 000 000 065
11	58789/225	0. 000 000 012	109125/225	0. 000 000 006
7.5 12	69921/225	0. 000 000 001	129825/225	0. 000 000 000
13	82021/225	0. 000 000 000		
0	1	0. 032 053 108	1	0. 032 053 108
1	185/64	0. 010 429 985	289/64	0. 006 676 634
2	137/16	0. 003 533 558	241/16	0. 002 008 703
3	1153/64	0. 001 454 992	2089/64	0. 000 803 066
4	125/4	0. 000 757 686	229/4	0. 000 413 584
5	3089/64	0. 000 420 447	5689/64	0. 000 228 293
8.0 6	1105/16	0. 000 182 104	2089/16	0. 000 096 326
7	5993/64	0. 000 057 377	11089/64	0. 000 031 009
8	122	0. 000 013 485	226	0. 000 007 279
9	9865/64	0. 000 002 452	18289/64	0. 000 001 322
10	3041/16	0. 000 000 356	5689/16	0. 000 000 190
11	14705/64	0. 000 000 042	27289/64	0. 000 000 022
12	1093/4	0. 000 000 004	2089/4	0. 000 000 002
13	20513/64	0. 000 000 000	38089/64	0. 000 000 000

		XI	XII	XIII	XIV
		$1+(q_1)^2 \frac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q_1)^2 \frac{n^2}{x_F^2}$	Col. VI/Col. XIII
		$q_1=11$		$q_1=15$	
x_F	n				
	0	1	0. 030 099 110	1	0. 030 099 110
	1	773/289	0. 010 674 742	1189/289	0. 006 939 929
	2	2225/289	0. 003 675 183	3889/289	0. 002 102 669
	3	4645/289	0. 001 606 640	8389/289	0. 000 889 598
	4	8033/289	0. 000 804 937	14689/289	0. 000 440 197
	5	12389/289	0. 000 475 202	22789/289	0. 000 258 338
	6	17713/289	0. 000 242 473	32689/289	0. 000 131 387
8.5	7	24005/289	0. 000 091 693	44389/289	0. 000 049 586
	8	31265/289	0. 000 025 701	57889/289	0. 000 013 881
	9	39493/289	0. 000 005 522	73189/289	0. 000 002 979
	10	48689/289	0. 000 000 239	90289/289	0. 000 000 506
	11	58853/289	0. 000 000 130	109189/289	0. 000 000 070
	12	69985/289	0. 000 000 015	129889/289	0. 000 000 008
	13	82085/289	0. 000 000 001	152389/289	0. 000 000 000
	14	95153/289	0. 000 000 000	176689/289	
	0	1	0. 027 904 243	1	0. 027 904 243
	1	202/81	0. 011 044 425	306/81	0. 007 290 764
9.0	2	565/81	0. 003 766 548	981/81	0. 002 169 316
	3	130/9	0. 001 751 705	234/9	0. 000 973 169
	4	2017/81	0. 000 868 766	3681/81	0. 000 476 039

		XI	XII	XIII	XIV
		$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q1)^2 \dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
		$q1=11$		$q1=15$	
x_F	n				
	5	3106/81	0. 000 513 238	5706/81	0. 000 279 376
	6	493/9	0. 000 297 382	909/9	0. 000 161 286
	7	6010/81	0. 000 133 553	11106/81	0. 000 072 272
	8	7825/81	0. 000 044 473	14481/81	0. 000 024 032
	9	122	0. 000 011 255	226	0. 000 006 075
9.0	10	12181/81	0. 000 002 237	22581/81	0. 000 001 207
	11	14722/81	0. 000 000 359	27306/81	0. 000 000 193
	12	1945/9	0. 000 000 047	3609/9	0. 000 000 025
	13	20530/81	0. 000 000 005	38106/81	0. 000 000 002
	14	23791/81	0. 000 000 000	44181/81	0. 000 000 000
	0	1	0. 025 983 416	1	0. 025 983 416
	1	845/361	0. 011 337 172	1261/361	0. 007 597 074
	2	2297/361	0. 003 882 419	3961/361	0. 002 251 431
	3	4717/361	0. 001 860 735	8461/361	0. 001 037 358
	4	8105/361	0. 000 952 788	14761/361	0. 000 523 158
	5	12461/361	0. 000 544 990	22861/361	0. 000 297 061
9.5	6	17785/361	0. 000 340 729	32761/361	0. 000 184 972
	7	24077/361	0. 000 178 557	44461/361	0. 000 096 694
	8	31337/361	0. 000 070 286	57961/361	0. 000 038 000
	9	39565/361	0. 000 020 898	73261/361	0. 000 011 286

	XI	XII	XIII	XIV
	$1+(q_1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q_1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
	$q_1=11$		$q_1=15$	

x_F	n				
	10	48761/361	0. 000 004 839	90361/361	0. 000 002 611
	11	58925/361	0. 000 000 898	109261/361	0. 000 000 484
	12	70057/361	0. 000 000 137	129961/361	0. 000 000 074
9.5	13	82157/361	0. 000 000 017	152461/361	0. 000 000 009
	14	95225/361	0. 000 000 001	176761/361	0. 000 000 001
	15	109261/361	0. 000 000 000	202861/361	0. 000 000 000

x_F	n				
	0	1.00	0. 024 646 010	1	0. 024 646 010
	1	2.21	0. 011 410 197	3.25	0. 007 758 934
	2	5.84	0. 004 061 866	10.00	0. 002 372 129
	3	11.89	0. 001 932 002	21.25	0. 001 081 012
	4	20.36	0. 001 044 242	37.00	0. 000 574 615
	5	31.25	0. 000 582 945	57.25	0. 000 318 201
	6	44.56	0. 000 371 834	82.00	0. 000 202 060
	7	60.29	0. 000 220 983	11.25	0. 000 119 758
10.0	8	78.44	0. 000 102 005	145.00	0. 000 055 181
	9	99.01	0. 000 035 537	183.25	0. 000 019 200
	10	122.00	0. 000 009 565	226.00	0. 000 005 163
	11	147.41	0. 000 002 049	273.25	0. 000 001 105
	12	175.24	0. 000 000 358	325.00	0. 000 000 193

		XI	XII	XIII	XIV
		$1+(q1)^2\frac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q1)^2\frac{n^2}{x_F^2}$	Col. VI/Col. XIII
		$q1=11$		$q1=15$	
X_F	n				
	13	205.49	0. 000 000 052	281.25	0. 000 000 028
	14	238.16	0. 000 000 006	442.00	0. 000 000 003
10.0	15	273.25	0. 000 000 000	507.25	0. 000 000 000
	0	1	0. 023 780 906	1	0. 023 780 906
	1	925/441	0. 011 296 435	1341/441	0. 007 792 097
	2	2377/441	0. 004 279 520	4041/441	0. 002 517 302
	3	4797/441	0. 001 991 378	8541/441	0. 001 118 445
	4	8185/441	0. 001 124 210	14841/441	0. 000 620 016
	5	12541/441	0. 000 633 680	22941/441	0. 000 346 409
	6	17865/441	0. 000 395 949	32841/441	0. 000 215 390
	7	24157/441	0. 000 256 041	44541/441	0. 000 138 864
10.5	8	31417/441	0. 000 136 712	58041/441	0. 000 074 001
	9	39645/441	0. 000 055 600	73341/441	0. 000 030 055
	10	48841/441	0. 000 017 368	90441/441	0. 000 009 379
	11	59005/441	0. 000 004 284	109341/441	0. 000 002 312
	12	70137/441	0. 000 000 857	130041/441	0. 000 000 462
	13	82237/441	0. 000 000 142	152541/441	0. 000 000 076
	14	95305/441	0. 000 000 019	176841/441	0. 000 000 010
	15	109341/441	0. 000 000 002	202941/441	0. 000 000 000

		XI	XII	XIII	XIV
		$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
		$q1=11$		$q1=15$	
x_F	n				
	0	1	0. 023 023 101	1	0. 023 023 101
	1	2	0. 011 156 862	346/121	0. 007 803 354
	2	5	0. 004 471 181	1021/121	0. 002 649 426
	3	10	0. 002 069 893	2146/121	0. 001 167 088
	4	17	0. 001 182 198	3721/121	0. 000 653 529
	5	26	0. 000 693 744	5746/121	0. 000 379 832
	6	37	0. 000 421 320	8221/121	0. 000 229 442
11.0	7	50	0. 000 282 136	11146/121	0. 000 153 142
	8	65	0. 000 170 362	14521/121	0. 000 092 273
	9	82	0. 000 080 383	18346/121	0. 000 043 473
	10	101	0. 000 029 086	22621/121	0. 000 015 713
	11	122	0. 000 008 250	226/121	0. 000 004 453
	12	145	0. 000 001 884	32521/121	0. 000 001 016
	13	170	0. 000 000 355	38146/121	0. 000 000 191
	14	197	0. 000 000 056	44221/121	0. 000 000 030
	15	226	0. 000 000 007	50746/121	0. 000 000 000
	16	257	0. 000 000 000		

	XI	XII	XIII	XIV
	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q1)^2\dfrac{n^2}{x_F^2}$	Col. VI/Col. XIII
	ql=11		ql=15	
X_F n				
0	1	0. 022 086 660	1	0. 022 086 660
1	1013/529	0. 011 130 188	1429/529	0. 007 890 049
2	2465/529	0. 004 592 212	4129/529	0. 002 741 536
3	4885/529	0. 002 178 147	8629/529	0. 001 233 080
4	8273/529	0. 001 223 860	14929/529	0. 000 678 210
5	12629/529	0. 000 752 466	23029/529	0. 000 412 649
6	17953/529	0. 000 454 243	32929/529	0. 000 247 654
11.5 7	24245/529	0. 000 301 797	44629/529	0. 000 163 953
8	31505/529	0. 000 199 213	58129/529	0. 000 107 970
9	39733/529	0. 000 107 876	73429/529	0. 000 058 372
10	48929/529	0. 000 045 091	90529/529	0. 000 024 371
11	59093/529	0. 000 014 691	109429/529	0. 000 007 933
12	70225/529	0. 000 003 827	130129/529	0. 000 002 065
13	82325/529	0. 000 000 816	152629/529	0. 000 000 440
14	95393/529	0. 000 000 145	176929/529	0. 000 000 078
15	109429/529	0. 000 000 022	203029/529	0. 000 000 011
16	124433/529	0. 000 000 002	230929/529	0. 000 000 001
17	140405/529	0. 000 000 000	260629/529	0. 000 000 000

		XI	XII	XIII	XIV
		$1+(q_1)^2\frac{n^2}{x_F^2}$	Col. VI/Col. XI	$1+(q_1)^2\frac{n^2}{x_F^2}$	Col. VI/Col. XIII
		$q_1=11$		$q_1=15$	
X_F	n				
	0	1	0. 020 966 886	1	0. 020 966 886
	1	265/144	0. 011 220 521	2.5625	0. 008 058 098
	2	628/144	0. 004 654 212	7.25	0. 002 799 660
	3	1233/144	0. 002 298 802	15.0625	0. 001 306 787
	4	2080/144	0. 001 265 949	26	0. 000 703 305
	5	3169/144	0. 000 799 897	40.0625	0. 000 439 396
	6	4500/144	0. 000 495 196	57.25	0. 000 270 304
	7	6073/144	0. 000 320 401	77.5625	0. 000 174 213
	8	7888/144	0. 000 221 455	101	0. 000 120 107
12.0	9	9945/144	0. 000 135 138	127.5625	0. 000 073 164
	10	12244/144	0. 000 064 936	157.25	0. 000 035 112
	11	14785/144	0. 000 024 272	190.0625	0. 000 013 112
	12	122	0. 000 007 204	226	0. 000 003 889
	13	20593/144	0. 000 001 740	265.0625	0. 000 000 938
	14	23860/144	0. 000 000 349	307.25	0. 000 000 188
	15	27369/144	0. 000 000 059	352.5625	0. 000 000 032
	16	31120/144	0. 000 000 008	401	0. 000 000 004
	17	35113/144	0. 000 000 001	452.5625	0. 000 000 000
	18	39348/144	0. 000 000 000		

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2. Symbols used herein:

q = sound wave vector

l = electronic mean free path

v_F = Fermi velocity of electrons

c_s = speed of sound

m = electronic mass

M = ionic mass

$-e$ = electronic charge

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